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IDENTIFIERS Teaching Information Processing System

ABSTRACT

A program providing small grants to faculty members to carry out promising proposals for instructional improvement was undertaken at Memphis State University in 1974. Herein are included fifteen reports describing projects conducted during the third year of the program, and a report evaluating the small grant program. The reports focus on: professional reading skill; teaching of experimental design and statistics; computer programming for financial analysis; computer assistance for laboratory problems in petroleum geology; an observational study of undergraduate teaching; graphic conceptual tools for urban planning problems; an intradisciplinary course in language and performance styles; communication skills for graduate students in education; the use of Teaching Information Processing System (TIPS) in chemistry, physics, and economics; videototechnology for bringing local expertise into the classroom, for sophomore physics lab experiments, and for Spanish review; and the use of pseudo-isochromatic plates in art students' color perception. (HSE)

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"Improving Instruction at MSU"

IMPROVING INSTRUCTION AT MSU

Edited by
G. Douglas Mayo

Memphis State University
Memphis, Tennessee

An Equal Opportunity University

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PREFACE

In recent years a number of institutions have encouraged their faculties to improve instruction by means of providing small grants to faculty members to carry out promising proposals for instructional improvement. A program of this type was initiated at Memphis State University early in 1974. Fifteen of the reports contained herein describe projects conducted during the third year of the program. Similar documents containing reports on projects conducted during the first and second year were published in 1976 and 1977.

An additional report is included in the present monograph, describing an evaluation of the small grant program at Memphis State. The primary purpose of the evaluation project was to provide a basis for improving the program, but inferences also can be drawn concerning its overall effectiveness.

The procedure used in selecting small grant projects for funding consisted of inviting full-time faculty members to submit proposals which they feel would lead to improvement of learning in their courses and perhaps would have broader applications. It was anticipated that resources available to support such projects would not be sufficient to support all of the proposals that would be submitted. It was also felt that it would be helpful to the faculty to know in advance the basis on which projects would be selected. Therefore, the invitation to submit proposals contained a list of seven criteria in the program and are reported herein. The criteria were as follows:

- 1) First and foremost, the proposed project should have a good probability of improving learning in the course in which it was undertaken. Stated differently, the basic concern or idea should be sound and capable of effective implementation.
- 2) If successful, the prospect for continued use of the improvement in the course in which the project was conducted should be good.
- 3) Projects having a probable "multiplier effect" would tend to receive preference. One aspect of this is the number of students whose learning would be affected. Thus, undergraduate courses having several sections would be good prospects. Another aspect of a "multiplier effect" would be the extent to which improved

learning demonstrated in the course in which the project was conducted could be generalized to a broader spectrum of university courses.

4) The effects of the project should be capable of adequate measurement. Upon completion of the project it is desirable to know to what extent the objectives of the project were achieved, together with any unfavorable side-effects.

5) The project should be more appropriate to the purpose of this small grant program than to other University sponsored programs. For example, projects which test hypotheses concerning the basic nature or conditions of learning were viewed as most appropriately supported by grants for faculty research than by this program. In the case of the present program the necessary basic knowledge already should be available, and the probability should be good that it could be applied to bring about improvement in learning.

6) Instances in which any required faculty released time could be provided by the academic departments concerned, leaving support of other requirements of the project to the small grant program, would receive some preference over projects that required a major part of the grant for faculty salaries.

7) Insofar as practicable, different types of projects and projects from a number of different departments would be selected.

Each of the proposals contained a proposed budget which listed the type of support that would be required and the amount of each item. The budgets for the proposals that were funded ranged from \$600 to \$1100 with a mean of \$950. Budget items submitted in one or more project proposals included expenses for: supplies, equipment, released time for the faculty member, salaries for student assistants, and funds for such services as clerical, photographic, and printing. As it turned out, the fifteen projects fell naturally into five areas: improvement of instruction, development of new courses, Teaching Information Processing System (TIPS) applications, video technology applications, and measurement and evaluation. These topical areas will be recognized as the five parts into which the monograph is divided. The report on the evaluation of the MSU small grant programs, mentioned previously, was included under the fifth area, measurement and evaluation.

The program of small grants to facilitate learning is administered by the Center for Instructional Service and Research. In addition to providing monetary support for approved budget items of the projects, the Center also assists the faculty members conducting each project, to the extent that they desire, in several areas in which the Center purports to have special competence. These areas include systematic course development, development of instructional aids, applications of educational technology, and design of evaluation plans.

As editor, I wish to acknowledge the very obvious contribution of each of the contributors to the monograph, whose names are listed in the table of contents. Thanks also are due to members of the Center for Instructional Service and Research for their constructive participation in a number of the projects, and in particular to Mrs. Barbara Dorsett, who handled the logistic aspects of each of the projects and assumed significant responsibilities in the preparation of the manuscript. Finally, the program of small grants to facilitate learning has received strong support from top administrative officials of the University, including, especially, the office of the Vice President of Academic Affairs and the Dean of each of the Colleges. This support and the support of Dr. Lester Pourciau, Director of Libraries, in proposing that the composite report of the projects be included in the J. W. Brister Library Monograph Series were especially instrumental in bringing the monograph to fruition.

G. Douglas Mayo, Director

*Center for Instructional Service
and Research*

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PART I
IMPROVEMENT OF INSTRUCTION

LEARNING ASSISTANCE PROGRAM: ACCENT ON PROFESSIONAL READING SKILL

Thomas A. Rakes, Department of Curriculum and Instruction

In the past decade, a proliferation of reading and study skills programs, laboratories, and centers has emerged. In a 1974 survey reported by Smith, Enright and Devirian (1975), little continuity or consistency existed between many of those 1,258 colleges and universities surveyed. At Memphis State University a Reading Study Skills Program was established in 1972. This program currently provides instruction through both credit and no-credit continuing education classes. In 1974 the Educational Support Program was opened to provide on-going assistance to college students in the areas of mathematics, English, reading and counseling. As in the Study Skills program, students must seek assistance by attending classes or individual study sessions provided in a designated center or laboratory.

These and other similar programs have been successful, and efforts to reach more students have among other offerings included special seminars on a variety of study skills, special tutorial classes and the availability of individualized learning programs in the library. This project extends such services further by bringing instruction in using selected study skills techniques to students enrolled in content classes.

THE PROGRAM

The realities of teaching in a university include numerous urgent problems, some of an academic or content nature, others of an educational or "dissemination and processing of information" type. The Learning Assistance Program (LAP) focused on providing on-the-spot, content related instruction to students on any one or all of the following procedures: 1) How to read your textbook more efficiently, 2) Note taking strategies, 3) How to study for examinations and take tests, and 4) A readability analysis of the textbook (provided to the instructor).

During the first week of the Spring, 1977, semester faculty members in six departments were notified as to the availability of the service to undergraduate students upon the request of the instructor and with the consent of the departmental chairman. Participating faculty were then contacted and a class session was scheduled for a study skills presentation using the adapted text for the particular class.

4

Prior to classroom presentations on study skills, students' notes were collected for study. Within one week notes were returned after a class profile of trends was determined. A minimum of forty minutes was required for professional book reading and note taking skills. An additional twenty to thirty minutes was necessary for presentation of how to study and test taking strategies. All classes used in the study were described as "primarily lecture style" by the instructor.

The presentation and practice of proven study skills techniques in adopted books provided all students a practical opportunity for improved learning and achievement early in the semester. The optional readability analysis of the textbook provided the instructor with useful information relative to using the text. Additionally, students could seek further instruction of a similar or related nature through use of existing courses and services elsewhere on campus.

PROCEDURES

Source of Data

The sample used in the project was those faculty and undergraduate students who volunteered for participation in the program through selected departments within the University. The responsibility for recruitment, presentation of instruction, gathering of data, record keeping and data analysis was assumed by the LAP staff. A total of twenty-four classroom presentations was given with an unequal number of readability analyses, thirty-one in number. Several additional requests for textbook readability analysis were received from faculty members who desired to participate in that phase only. Four additional classes totaling ninety-two students were used as a control group. Both pre-post opinionnaire and class note samples were obtained for comparative purposes.

Collection of Data

One instrument was used. This instrument was a one-page opinionnaire designed to obtain the subject's self-evaluation as to the status and subsequent value of the study skills instruction. The instrument was developed as an evaluation scale similar to the Kropp-Verner (1957). The instrument was administered by a facilitator prior to the instructional sessions and again within six weeks following instruction sessions. Arithmetical means and percentages were employed to analyze results. See Appendix A for the evaluation instrument used. Student class notes were also collected and compared to class trends recorded prior to the conduct of training sessions. Notes were studied to determine student grammatical and organizational levels (high, medium, low).

Textbook analyses were conducted by applying indices of readability, based on the Fry Readability Graph (shown in Appendix B). The Fry Graph is a

widely used measure of reading difficulty for printed materials, K-College level.

Instruction

Two training sessions were available. The initial presentation/simulation was note taking skills and how to read a textbook. An additional session was provided upon request. How to prepare for and perform on tests could be selected in addition to the preliminary study skills training. Appendix C includes handouts provided participants in the study in addition to examples, demonstrations and suggestions given verbally during actual class visits.

Course instructors were asked to participate in training sessions and were provided one individual follow-up conference after the in-class session was conducted. Information relative to class note taking trends, study attitudes and the readability of the adopted text were discussed.

Results

The purpose of the study was to determine the effect of mini-lessons in note taking and study techniques upon self-rated attitudes and note taking performance of undergraduate University students. The subjects included 624 students from 24 classes, 406 females and 218 males. Participating faculty numbered 31, twenty-four whose classes participated in the study and seven who expressed an interest in a readability analysis of their text without classroom training sessions. Twenty-two of the twenty-four classes received two study skills presentations.

Analysis of Textbooks

Textbook difficulty ranged from 8th grade level through college level with 80.7 percent falling on a 10th grade level or higher. Nineteen per cent of those books analyzed were written on a college level. Table 1 shows the grade level by percentage.

Table 1
(N = 31)

Readability Analysis by Grade Level and Frequency

Level	College	12	11	10	9	8
Percent of total	19.4	22.6	22.6	16.1	13.0	6.5
Number of books	6	7	7	5	4	2

Analysis of Attitude Inventory

Data from twenty-two classes were used. Of the original twenty-four classes, all but two participated in two training sessions and a single post administration of the attitude survey and class notes analysis. Results are based upon response of 541 subjects of an original 584 subjects who participated in the initial training sessions for the twenty-two classes. Subjects reflected a mean pre-training score of 50.4 (range 28.7 to 74.6). Post-training scores ranged from 37.2 to 77.1 with a mean of 61.4. The mean difference noted six weeks after the training session was 11.4 (significant at the .01 level). Due to wide variability of scores between items on the survey and a lack of control to insure subject sincerity of response to the instrument, an item analysis was not specifically useful. Items dealing with vocabulary, rereading, remembering and an interest in a special center were shown to be priority items.

Analysis of Class Notes

A sample of 537 subjects were used for a pre-post training examination of class notes. Table 2 shows the numerical results.

Table 2
Class Notes Analysis

	Pre-Training	Post-Training	Difference
	Grammar/Organization	Grammar/Organization	Grammar/Organization
High	80.6	128.9	+ 48.3
Medium	128.9	230.9	+102.0
Low	327.6	177.2	-150.4

All groups, high, medium and low, attained significant total group mobility. Specifically, 63%, 56%, and 54% group shifts upward were found for high, medium and low groups respectively.

Of an original 92 subjects, 81 remained in four control group classes. Nearly 30% (29.6) of the control subjects generated improved note taking scores and slightly higher overall scores on the opinionnaire. Statistically, these differences were minimal.

Discussion

Generalization from the findings of the study are limited due to a bias created by the 1) use of instructor volunteers as a means of obtaining subjects, 2) fact that no data were available as to student grade point average or general level of reading competency, and 3) lack of control and consistency of faculty lecture organization and presentation styles. Still,

a pattern of results obtained make the following conclusions worth noting:

1. "Note taking and study habits of university undergraduates improve as a result of exposure to abbreviated training sessions." If this study were to be improved upon by removing those limitations discussed earlier in this section, the degree of student progress, improved learning in classes and simply, better teaching could be enacted and measured. The sacrifice in class time is justified in view of possible benefits that could improve a student's sustained learning potential in a class.
2. "Faculty members are interested in how well their students take notes." Implied also is a concern for their own teaching style and how it affects student knowledge and test performance.
3. "Faculty members are interested in learning about the readability and organization of their adopted textbooks." Numerous positive comments reflected a genuine need for and appreciation of the readability and note taking conferences held with participating faculty.
4. "A majority of the textbooks surveyed were written on a readability level of the 11th grade or higher." While several books (35.6%) fell below grade eleven, the books currently in use are sufficiently difficult to create reading problems for many university students. This study did not, however, specifically compare book-reader difficulty levels.

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APPENDIX A

Student Number _____ Age _____ Sex _____ Date _____

Classification _____

DIRECTIONS: Read each of the following statements and mark one of the five categories that best describes you.

Overall, how well do you think you read?

very well	well	average	poorly	very poorly
-----------	------	---------	--------	-------------

When reading, the vocabulary gives me a problem . . .

rarely	sometimes	frequently	generally	almost always
--------	-----------	------------	-----------	---------------

I find I must reread material to understand it . . .

rarely	sometimes	frequently	generally	almost always
--------	-----------	------------	-----------	---------------

If a special study center were available for improving my reading I would use it . . .

rarely	sometimes	frequently	generally	almost always
--------	-----------	------------	-----------	---------------

I usually look for a single idea in each paragraph . . .

rarely	sometimes	frequently	generally	almost always
--------	-----------	------------	-----------	---------------

I examine each of my textbooks for its overall organization . . .

rarely	sometimes	frequently	generally	almost always
--------	-----------	------------	-----------	---------------

I have trouble remembering what I read . . .

rarely	sometimes	frequently	generally	almost always
--------	-----------	------------	-----------	---------------

I have an effective method for study-reading. . .

rarely	sometimes	frequently	generally	almost always
--------	-----------	------------	-----------	---------------

I adjust my reading speed to the purpose and difficulty of the material. . .

rarely	sometimes	frequently	generally	almost always
--------	-----------	------------	-----------	---------------

I find it hard to pick out the important points of a reading assignment . . .

rarely	sometimes	frequently	generally	almost always
--------	-----------	------------	-----------	---------------

I study two hours or more each day outside of class. . .

rarely	sometimes	frequently	generally	almost always
--------	-----------	------------	-----------	---------------

In most classes, I find it difficult to listen and write down the most important points. . .

rarely	sometimes	frequently	generally	almost always
--------	-----------	------------	-----------	---------------

I have a dictionary within reach when I study. . .

rarely	sometimes	frequently	generally	almost always
--------	-----------	------------	-----------	---------------

I can read for as long as thirty (30) minutes without becoming bored. . .

rarely	sometimes	frequently	generally	almost always
--------	-----------	------------	-----------	---------------

I am comfortable and relaxed when reading. . .

rarely	sometimes	frequently	generally	almost always
--------	-----------	------------	-----------	---------------

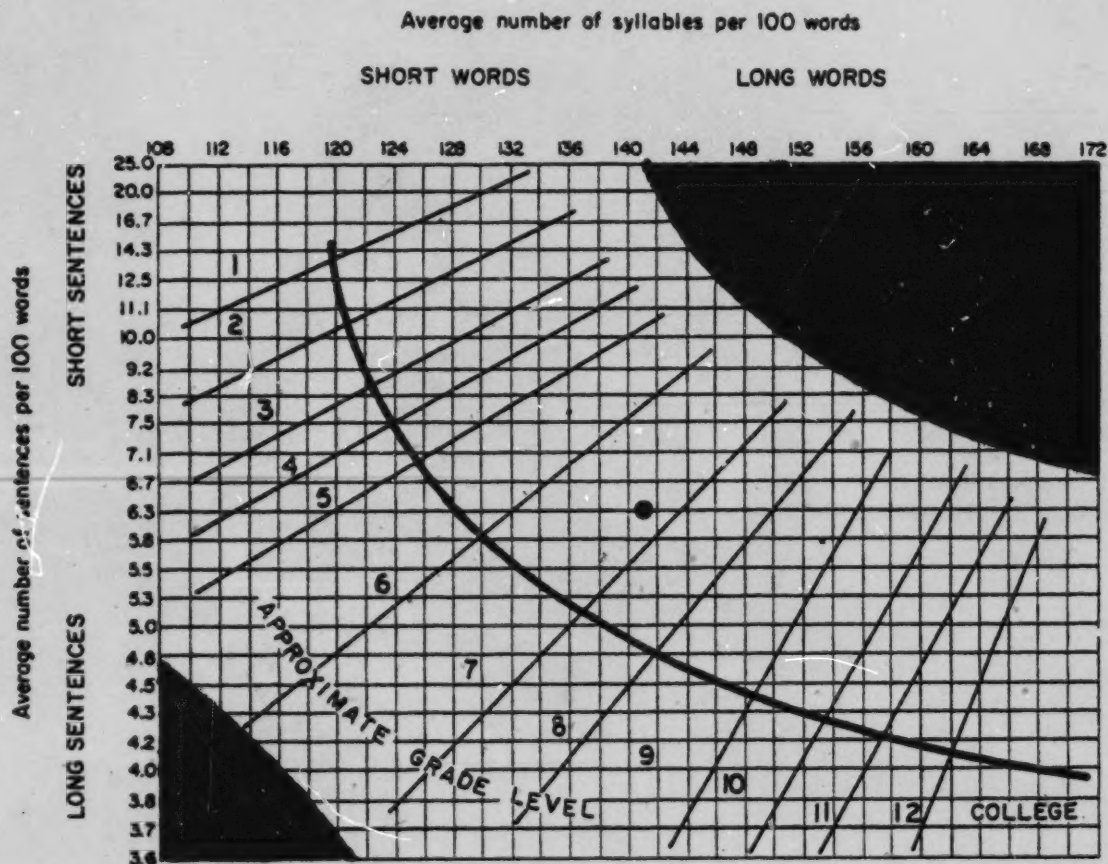
My eyes tire easily when reading. . .

rarely	sometimes	frequently	generally	almost always
--------	-----------	------------	-----------	---------------

How many non-required books do you read per semester? _____

GRAPH FOR ESTIMATING READABILITY

by Edward Fry, Rutgers University Reading Center,
New Brunswick, New Jersey



DIRECTIONS: Randomly select three 100-word passages from a book or an article. Plot the average number of syllables and the average number of sentences per 100 words on the graph to determine the grade level of the material. Choose more passages per book if great variability is observed, and conclude that the book has uneven readability. Few books will fall in the gray area, but when they do, grade level scores are invalid.

EXAMPLE:	SYLLABLES	SENTENCES
1st Hundred Words	124	6.6
2nd Hundred Words	141	5.5
3rd Hundred Words	158	6.8
AVERAGE	141	6.3

READABILITY 7th GRADE (see dot plotted on graph)

For further information and validity data, see the April, 1968 Journal of Reading and the March, 1969 Reading Teacher.

APPENDIX C

TAKING NOTES ON LECTURES*

1. Attend all lectures. Be sure to arrive on time. It's not only polite, but many professors give an outline of what they intend to cover. Most people benefit from a minute or two to settle their thoughts prior to class beginning.
2. Keep separate notes for each class. An 8½ x 11 inch looseleaf notebook with dividers is generally best. Use the dividers to label each subject and to keep your notes organized.
3. Date each lecture.
4. Use only one side of a page for notes. It is distracting to flip back and forth through your notes while studying.
5. Come to class prepared to take notes. Do not try to take notes on an envelop or a paper towel.
6. Write legibly. The use of standard size papers is a help here. The use of abbreviations is probably necessary, however, try to limit them to standard, or easily recognized forms. It is not necessary to write complete sentences, but it is important to write complete thoughts.
7. Be alert to key phrases such as "note this," "the important point here is," or "You'll see this later." It is rare to find a professor who uses the "I've Got a Secret" method of teaching and testing. However, it is common to see students ignoring these cues as well as what is written on the blackboard or other visual aids.
8. Use some system of organizing your notes as you take them. One of the most common is to take notes on the right side of the page leaving a large margin on the left. Use the margin to reduce the lecture to major topics and to key important ideas from the text to the lecture.
9. Pay as close attention to the end of a lecture as to the beginning. If the lecturer has not paced himself, he may have to try to cram important content into the last few minutes of the lecture.
10. After a lecture, take a few minutes to review your notes. Have a cup of coffee with a friend, and together outline and organize the lecture you've just heard.
11. At least once a week take the time to reflect on the content of the class, lectures, and texts. Some students attempt to write and answer questions they think the professor may ask.
12. Space your study across time. Cramming for an exam is rarely effective.

*Learning Assistance Project, Department of Curriculum and Instruction Reading Center, Center for Instructional Service and Research, Memphis State University, Spring, 1977.

IMPROVED TEACHING AND LEARNING OF EXPERIMENTAL DESIGN AND STATISTICS

S. P. Wong, *Department of Mathematical Sciences*
and
John V. Irwin, *Department of Audiology and Speech Pathology*

Statistical methods courses are usually taught without any mathematical proof or derivation, even in mathematics departments, due to the time factor or the background of the students. Students are spoon-fed the formulas, methods, and testing procedures. Thus, they have a lot of difficulty in understanding the basic concepts and often do not know when and why a certain test is better than others. To help students gain some insight and justification about statistical procedures, an instructor may make use of a large collection of samples obtained from certain populations. There are computer programs that would generate data from some populations. But, as far as we know, there are no programs that would generate data for analysis in experimental design.

In many instances, an instructor finds it difficult to develop suitable data to use as examples in class, homework, or examinations. In lower division courses data may be found in books. But still sometimes data pertinent to a certain topic, like experimental design data, are not generally available.

The purpose of our project was to create a package of computer programs that would generate data from different kinds of models (populations). We have developed programs that generate data for 1) one way model (independent normal populations), 2) correlated normal populations, 3) two-way fixed effects model, 4) two-way mixed effects model (block design), 5) two-way random effects model, and 6) three-way fixed effects model. Sample or cell sizes need not be the same in 1), 2), 3), and 6). The data generated can have the format used either in SPSS or BMD statistics packages and can therefore be analyzed using the packages without any extra recording. Since one sample t-test is not given in SPSS or BMD, it is incorporated in both 1) and 2). The programs can be used on a time-sharing terminal, and no background in computer programming is required.

The difficulties in learning or teaching statistical methods can be greatly reduced if data are easily accessible through the computer. For example, some of the basic concepts in statistics, like significance level, power, confidence interval, etc., can be explained by the use of many samples from

a population. Also, when and why a block design is better than a one way model can be illustrated by creating many samples. An instructor can create different kinds of data, analyze and use them as examples, or create and store the data in files for homework or examinations.

In addition, a practical obstacle faced by students in statistical methods, especially in experimental design, is the time they have to spend reproducing data from one source to the other, like key punching or coding. Students need to learn to analyse different kinds of data to familiarize themselves with the different tests and statistical programs. Usually the data are not stored in the computer or the stored data are not suitable for different statistical procedures. Hence, the time spent on reproducing data can amount to a great deal. As already noted, the data generation system described essentially eliminates this problem because the data format can be used in other SPSS or BMD statistical packages.

The programs were used in the statistics methods courses taught by the authors during the fall semester, 1977. After trying them and improving them as necessary, the programs are now available to other statistics instructors. Further, the skills acquired in developing the programs would definitely be helpful if in the future we want to computerize our teaching of statistics.

DEVELOPMENT OF COMPUTER PROGRAMS FOR FINANCIAL ANALYSES

Tye Kim,¹ Department of Finance, Insurance and Real Estate

As teaching instruments, two computer programs were developed. One program, called FUTVAL, computes future values of a one dollar investment; the other program, called STOCKVAL, computes investment values of common stock shares. Both programs were designed to be used in such courses as Business Finance, FIR 3410; Investments, FIR 3710; Managerial Finance, FIR 4440; Analysis and Control of Business, FIR 7610; and Seminar in Investment Management, FIR 7710.

The rationale and characteristics of the programs are explained below:

FUTVAL

The principle of compounding an investment is a very important concept utilized in various types of economic and financial planning. To facilitate teaching and application of the concept, different versions of compound interest and annuity tables have been published. The Brister Library of Memphis State University has a two-volume set of tables, and finance textbooks usually contain small-scale tables.

The available tables are, however, less than ideal in demonstrating the power of compounding for three reasons. First, since two-digit rates of inflation have occurred in the past several years, the compounding principle should be demonstrated with higher rates of growth than those in currently available tables. Second, the available tables cannot accommodate a time period longer than 150 years. Third, with the compounding tables in the finance textbooks, future value of an investment at *daily* compounding cannot be computed easily.

The program, FUTVAL, was written to make up for the shortcomings of available tables. It accommodates time periods up to 400 years, nominal interest rates up to 15% per year, and compounding frequencies up to 365 times per year. In a computer run, the user may specify up to five time periods, five growth rates, and four compounding rates on each data card.

¹ Dr. Kim accepted a position at another institution at the end of the 1976-77 school year. Dr. Leslie S. Scruggs, Department of Finance, Insurance, and Real Estate, is looking after the utilization of the programs that were developed by Dr. Kim.

STOCKVAL

In the field of finance, valuation of financial assets, such as bonds and stocks, is an important subject to teach. There are three components in the valuation process. They are selection of a mathematical model, provision of input data, and computation. But classroom teaching of the valuation process is usually limited to explanation of models and very simple numerical illustration of the models. The reasons are: 1) providing realistic data often involves the difficult task of estimating a given financial asset's future benefits and associated risk; 2) the computation required is usually tediously repetitive and requires much time. This is especially true in the valuation of common stocks.

The purpose of the program, STOCKVAL, is to facilitate the student's learning of common stock valuation by minimizing his involvement in generating input data and in computation.

The following common stock valuation model was programmed:

$$PV = \sum_{t=1}^T \frac{D_t}{(1+k)^t} + \frac{P_T}{(1+k)^T} = \sum_{t=1}^T \frac{E_0(1+g)^t Q}{(1+k)^t} + \frac{E_0(1+g)^T M}{(1+k)^T}$$

where:

PV = the investment value (or present value) of a share of a given common stock at the beginning of the planning time horizon.

E_0 = the per share earnings for the subperiod preceding the first subperiod of the planning time horizon.

E_t = the per share earning for subperiod t .

D_t = the per share cash dividends paid at the end of subperiod t .

T = the length of the planning time horizon (e.g., $T=20$ years).

P_T = the per share market price at time T , the end of the planning time horizon.

Q = the constant cash dividend payout ratio.

M = the price-earnings ratio at the end of planning time horizon.

g = the rate of growth in per share cash dividends per subperiod.

k = the investor's required rate of return per subperiod.

In order to estimate the investment value of a given common stock share, the user of the program needs to specify only his required rate of return, k , and his planning time horizon, T . All other input data are estimated by the computer, based on the stock issuer's past performance records. Since the program is linked to the COMPUSTAT data bank of Memphis State University, the user may select any of about 2600 large U. S. companies. If the user wants to evaluate any stocks not included in the COMPUSTAT, it is necessary for him to furnish all input data.

As to the output, for each given required rate of return, the program prints out five present value tables, one for each price-earnings ratio. Within each table there are forty-nine present values, each of which present a unique combination of a growth rate in cash dividends and a time horizon. The wide range of present values is shown in order to take sampling errors into consideration and also to reveal the sensitivity of the present values to a change in any item of the input data.

EXPET:
A COMPUTER ASSISTED LABORATORY PROBLEM
FOR PETROLEUM GEOLOGY

David H. Lumsden, Department of Geology

This lab problem is designed to familiarize the student with the techniques and difficulties involved in the exploration for petroleum. It is essentially one long study broken up into segments in which various geologic aspects of petroleum exploration are highlighted. This approach has turned out to be more realistic and interesting than more conventional methods of a one-problem-per-week nature.

GENERAL METHOD

All students work in the same geographic area. The area is sub-divided into "drilling units" on which the students bid for the rights to drill. Each week a specific type of problem is assigned (structure map, lithofacies map, etc.). The student turns in his best interpretation of available data and is graded on each week's problem. The student must also "drill wells" at a minimum rate. The computer serves as a 1) storage place for data, 2) housekeeper for accounting the student's "funds," 3) a producer of maps to aid the student's interpretation. At the end of the semester the "winners," i.e., those who make money, receive a bonus on their grade; losers do not get a bonus nor do they suffer a grade loss.

SPECIFIC METHOD

The Camp Breckenridge, Kentucky area was selected as the exploration area. This is convenient because 1) of the instructor's familiarity with the area, 2) well logs are available, 3) there are multiple pay zones, and 4) the lithology is quite variable.

There are 112 useable, logged wells in the three drilling tracts of the area. Every well has been given an identification number and a location coordinate on an arbitrary grid system (map attached). At the start the students are given the logs of three wells all students get the same logs. They are taught log interpretation and log analysis for the first two labs. The Lab Schedule is shown on the following page. The third lab is used to teach EXPET procedures. Thereafter, students are required to drill at least one well per week, more if the class is small. This number is controlled by the need to drill all 112 wells by the end of the semester.

LAB SCHEDULE FOR PETROLEUM GEOLOGY

<u>Week</u>	<u>Problem</u>
1	Log Interpretation (recognition of lithologies)
2	Log Analysis (porosity, salt water, hydrocarbons)
3	Use of EXPET
4	Structure Contour Maps (I)
5	Stratigraphic Cross Section
6	Isopach Map (I)
7	Panel Diagram
8	Structure Contour Map (II)
9	Isopach Map (II)
10	Lithofacies Map (I)
11	Paleotopography and Petroleum
12	Lithofacies Map (II)
13	Examination of Well Cuttings
14	Lab Exam

Each student is assigned an oil company name—let's say Exxon. He enters the program and receives a position statement for that week which consists of the following:

- 1) his financial position
- 2) the number of wells he owns and their location
- 3) the drill sites he owns

He may then decide to buy more drill sites or drill a well where he already has rights. This decision is based on maps of a variety of types that he *must* draw to satisfy the specific "problem of the week" as well as the success or failure of his wells. The schedule of maps is given in the lab schedule.

EXPET has a mapping program option with its system. The student can have maps drawn by the computer on his data at any time. The instructor alone will have access to a "correct" data file and will be able to evaluate the student map by comparing the "correct" and student maps.

The student has one week of private knowledge about the success or failure of each well he drills. After one week the well log and results are available to all members of the class.

FIXED EXPET PARAMETERS

Starting Finances

Each student has one million dollars with which to start, plus an unlimited credit line (i.e., he can go into debt endlessly).

Debits

a) Each student is debited the cost of the well he has caused to be drilled. Well costs are 10 dollars per foot for the first 1,000 feet, 15 dollars per foot for the next 500 feet, and 25 dollars per foot for footage over 2,000 feet up to a maximum cost per well of \$50,000.

b) Each student loses \$80,000 per week to overhead costs.

c) Each student suffers financial reversals to uncontrolled factors (strikes, embargos, federal restraints, environmental problems, lawsuits, etc.). These costs are determined by a random event subroutine in EXPET. Every time a well is drilled the student is open to these costs, to a maximum of \$50,000 per event.

d) Each student is debited for the costs of the drilling rights of each drilling unit he obtains. Minimum bid is \$500 per drilling unit.

Credits

Successful wells are presumed to pay out for 20 years at the initial rate of production. Oil is presumed to be worth \$12 per barrel. For example, a well producing 20 barrels of oil per day will pay \$1,752,000.

THE PROGRAM

A listing of program EXPET is shown at the end of this report. It is written in interactive BASIC and the student need know nothing of computer programming to operate the system. Each call of the program supplies the student with a status summary of his "company." The student then is asked to select among three paths.

Option 1 - draws a map of the geologic unit selected by the student

Option 2 - "drills" a well specified by the student and enters that well in the student's company account

Option 3 - terminates the program

Three files are needed for running the program:

- 1) a current data file for each "company" identified by a color

Exxon	Green	Union	Black
Phillips	Red	Shell	Brown
Texaco	Yellow	Gulf	White
Amaco	Blue	Chevron	Gray
Standard	Purple	Mobil	Orange

The first line in each file contains 1) the company's net worth. The second line contains the coordinates of drill sites owned by the company but yet undrilled. Line 3, through a variable amount, gives vital statistics on each well so far drilled: well ID, X & Y coordinate, pay zone (if any), production (if any), total depth, well cost, well revenue (if any). When a color file is read in, the following program arrays are filled: Q (I)—well number, E (I)—X coordinate, F (I)—Y coordinate, H_z (I)—pay zone (if any), Ø (I)—barrels per day production (if any), P (I)—depth, R (I)—cost, and T (I)—profit (if any).

2) A student map file: Each company has its own map data file which needs weekly updating. These are: Exxon—Gremap, Phillips—Redmap, Texaco—Yelmap, Amoco—Blumap, Standard—Purmap, Union—Blamap, Shell—Bromap, Gulf—Whimap, Chevron—Gramap, and Mobil—Oramap. These files contain geologic data as follows:

Well ID	Tar Spring isopach
X coordinate	Hardinsburg isopach
Y coordinate	Cypress isopach
Third Penn isopach	Vienna structure
Waltersburg isopach	Barlow structure

These data are determined for each well by the student. Uncertain or unknown data are indicated by a 999.

3) The third file is a protected file with "correct" geologic data on each well. This file is used by the instructor to determine the accuracy of the student map.

LISTING OF PROGRAM EXPET

```

PCL
COPY EXPET TO LP
1 * PROGRAM EXPET
2 * A COMPUTER AIDED PETROLEUM GEOLOGY LAB PROBLEM
3 * STUDENT ENTERS THE PROGRAM WITH A COMPANY NAME
4 * EG EXXON. THREE DATA FILES ARE READ 1) A FILE OF
5 * COMPANY DATA 2) A FILE OF COMPANY GEOLOGIC DATA
6 * 3) A CENTRAL WELL FILE
30 DIM Q(20),E(20),P(20),H(20),C(20),F(20),R(20),T(20)
38 DIM Y(20),D(20)
40 PRINT "WHAT IS THE NAME OF YOUR CORPORATION?"
45 INPUT N$
50 PRINT
55 PRINT
60 IF N$=EXXON THEN 120
65 IF N$=PHILLIPS THEN 135
70 IF N$=TEXACO THEN 150
75 IF N$=AMOCO THEN 165
80 IF N$=STANDARD THEN 180
85 IF N$=UNION THEN 195
90 IF N$=SHELL THEN 210
95 IF N$=GULF THEN 225
100 IF N$=CHEVRON THEN 240
105 IF N$=MOBIL THEN 255
110 PRINT "RETYPE CORRECTLY THIS TIME"
115 GO TO 40
120 OPEN "GREEN" TO I2,INPUT
125 X$=GREEN
130 GO TO 265
135 OPEN "RED" TO I2,INPUT
140 X$=RED
145 GO TO 265
150 OPEN "YELLOW" TO I2,INPUT
155 X$=YELLOW
160 GO TO 265
165 OPEN "BLUE" TO I2,INPUT
170 X$=BLUE
175 GO TO 265
180 OPEN "PURPLE" TO I2,INPUT
185 X$=PURPLE
190 GO TO 265
195 OPEN "BLACK" TO I2,INPUT
200 X$=BLACK
205 GO TO 265
210 OPEN "BROWN" TO I2,INPUT
215 X$=BROWN
220 GO TO 265
225 OPEN "WHITE" TO I2,INPUT
230 X$=WHITE
235 GO TO 265
240 OPEN "GRAY" TO I2,INPUT
245 X$=GRAY
250 GO TO 265
255 OPEN "ORANGE" TO I2,INPUT
260 X$=ORANGE
265 INPUT I2,M1,I2
270 FOR I=1 TO 42
275 INPUT I2,Y(I),C(I)
280 NEXT I

```

```

285 INPUT I2,N5
290 FOR I=1 TO N5
295 INPUT I2,G1(I),Z(I),F(I),H(I),D(I),P(I),R(I),T(I)
300 NEXT I
305 CLS SE 12
310 PRINT TAB(10); "PETROLEUM NEWS OF THE DAY"
320 PRINT TAB(10); "*****"
325 G1=RND(M1)*13
330 G1=INT(G1)
335 IF G1=0 THEN J85
340 IF G1=1 THEN J33
345 IF G1=2 THEN J15
350 IF G1=3 THEN J35
355 IF G1=4 THEN J53
360 IF G1=5 THEN J63
365 IF G1=6 THEN J83
370 IF G1=7 THEN J33
375 IF G1=8 THEN J15
380 IF G1=9 THEN J33
385 PRINT "PRICE OF OIL INCREASES 5% "N5" PROFITS AN EXTRA $10,000"
390 M1=M1+10000
395 GO TO 540
400 PRINT "N5" SPENDS $10,000 IN CAPITAL"
405 M1=M1-10000
410 GO TO 540
415 PRINT TAB(5); "SCIENTISTS DISCOVER NEW IMPROVEMENTS IN THE PRODUCTION OF"
420 PRINT TAB(5); "OIL. SALES "N5" GAINS $20,000"
425 M1=M1+20000
430 GO TO 540
435 PRINT "CONGRESS PASSES A PRICE FREEZE BILL "N5" IS SET BACK $20,000"
440 M1=M1-20000
445 GO TO 540
450 PRINT "N5" DISCOVERS NEW COAL RESERVES IN WEST VIRGINIA "N5" GAINS $30,000"
455 M1=M1+30000
460 GO TO 540
465 PRINT "FIRE DESTROYS "N5" OFFICE BUILDING $30,000 WORTH OF DAMAGE"
470 M1=M1-30000
475 GO TO 540
480 PRINT TAB(5); "CHEATS U.S. GOVERNMENT OUT OF $40,000 WORTH OF TAXES"
485 PRINT TAB(5); "TAXES IS STILL UNDETECTED"
490 M1=M1+40000
495 GO TO 540
500 PRINT "N5" IS FINED $40,000 BY ENVIRONMENTAL PROTECTION AGENCY FOR OIL SPILL"
505 M1=M1-40000
510 GO TO 540
515 PRINT "GOLD IS DISCOVERED BY "N5" IN NEVADA "N5" GAINS $50,000"
520 M1=M1+50000
525 GO TO 540
530 PRINT "GEOLOGISTS FROM "N5" GO ON STRIKE "N5" IS SET BACK $50,000"
535 M1=M1-50000
540 PRINT "*****"
545 PRINT
550 *
555 * IF A CORPORATION IS BANKRUPT THEY WILL BE REQUESTED TO SEE TEACHER
560 *
565 IF M1<0 THEN J95
570 PRINT "GO SEE DR. LUMSDEN FOR YOU ARE BANKRUPT"
575 PRINT
580 *

```

```

585 *   A SUMMARY OF THE CORPORATION'S HOLDINGS IS PRINTED OUT
590 *
595 PRINT TAB(10); "CORPORATION SUMMARY"
600 PRINT TAB(5); "-----"
605 PRINT "AMOUNT OF MONEY OWNED -----"
610 PRINT "DRILLING LOCATIONS OWNED-----"
615 PRINT "NUMBER OF WELLS OWNED -----"
620 PRINT
625 PRINT "WELL #   LOCATION      COST   DEPTH DRILLED   PRODUCTION   GAIN"
630 PRINT "-----"
635 FOR I=1 TO N5
640 PRINT USING 650; J(I); E(I); F(I); R(I); P(I); D(I); T(I)
645 NEXT I
650 10:00      000 000 00000000  00000  0000 0000/0000  00000000
653 PRINT
654 PRINT
655 PRINT "LOCATION OF DRILL SITES X COORD   Y COORD"
656 FOR I=1 TO N2
660 PRINT TAB(27); Y(I); D(I)
670 NEXT I
675 PRINT
680 PRINT
685 OPEN X0 TO 12; PRINT OVER
690 PRINT 12; N1; N2
695 FOR I=1 TO N2
700 PRINT 12; Y(I); D(I)
705 NEXT I
710 PRINT 12; N5
715 FOR I=1 TO N5
720 PRINT 12; Q(I); E(I); F(I); H(I); J(I); P(I); R(I); T(I)
725 NEXT I
730 CLOSE 12
735 PRINT "CODE"
740 PRINT "1-----DRAWS A MAP"
745 PRINT "2-----DRAWS FOR OIL"
750 PRINT "3-----TERMINATES THIS PROGRAM"
755 PRINT "WHAT WOULD YOU LIKE FROM THE (TYPE 1, 2, OR 3)"
760 INPUT C9
765 IF C9=1 THEN 790
770 IF C9=2 THEN 1470
775 IF C9=3 THEN 1935
780 PRINT "TYPE 1, 2, OR 3"
785 GO TO 760
790 *   THIS SECTION OF THE PROGRAM PRINTS OUT A CONTOUR MAP
795 *   OF 9 EQUALLY SPACED CONTOUR BANDS; THE PROGRAM WILL READ
800 *   DATA FROM A DATA FILE IN WHICH THE NAME OF THE FILE WILL
805 *   BE INPUTED INTO THE COMPUTER. THE DATA FILE SHOULD
810 *   CONTAIN THE FOLLOWING:
815 *   FIRST LINE--NUMBER OF OBSERVATIONS (N)
820 *   SECOND LINE--EAST-WEST CO-ORDINATE
825 *   COMMA
830 *   21 NORTH-SOUTH CO-ORDINATE
835 *   COMMA
840 *   31 DEPENDENT VARIABLE
845 *   FOURTH THROUGH N LINE--SAME AS LINE 03
850 *****
900 DI 0(100,2), 4(100), V(60,100), B(100), A(12)
901 *
902 *   READS DATA FILE AND CALCULATES MAP PARAMETERS

```

```

903 *
904 READ 00,02,03,04
905 DA A 10,0,211,0,13,0,140,0
920 PRINT "WHAT IS THE NAME OF THE FILE FROM WHICH THE DATA WILL BE READ?"
925 INPUT K$
930 OPEN K$ TO: 1,INPJT
940 INPUT I1,N,M
945 FOR I=1 TO N
950 FOR J=1 TO M
955 INPUT I1,G(I,J)
960 NEXT J
965 NEXT I
970 CLOSE 11
975 PRINT
980 PRINT
985 PRINT "PLEASE BE PATIENT"
990 PRINT
995 PRINT
1000 I=70
1005 I1=42*(04-03)/(02-01)
1010 C1=(02-01)/(I1-1)
1015 C2=(04-03)/(I1-1)
1020 S1=((C1+C2)*(02+C2))/10000
1025 *
1030 * CALCULATE MAP VALUES
1035 *
1040 FOR I=1 TO 12
1045 G=0
1050 FOR J=1 TO 11
1055 *
1060 * CALCULATE DISTANCE**2 BETWEEN CURRENT GRID POINT AND ALL DATA POINTS.
1065 *
1070 FOR K=1 TO N
1075 W(K)=(01-G(K,1))**2+(04-G(K,2))**2
1080 NEXT K
1085 *
1090 * FIND THE 5 NEAREST DATA POINTS AND CALCULATE SUMS
1095 *
1100 S1=0
1105 S2=0
1110 FOR L=1 TO 5
1115 I1=1
1120 FOR K=2 TO N
1125 IF W(K)<W(I1) THEN 1220
1130 NEXT K
1135 IF W(I1)<S1 THEN 1190
1140 D=SQR(4*(I1))
1145 S1=S1+G(I1,1)/03
1150 S2=S2+1/03
1155 W(I1)=9+10**35
1160 NEXT L
1165 *
1170 * CALCULATE GRID POINT AND STORE IN MATRIX
1175 *
1180 V(I,J)=S1/S2
1185 G=0 TO 1195
1190 V(I,J)=3*(I,3)
1195 G=G1+C1
1200 NEXT J

```

```

1205 Q=Q+C2
1210 NEXT I
1215 GOTO 1245
1220 I=K
1225 GOTO 1130
1230 *
1235 * FIND LARGEST AND SMALLEST VALUES IN MAP
1240 *
1245 Y=V(1,1)
1250 Y=Y1
1255 FOR I=1 TO 12
1260 FOR J=1 TO 11
1265 Y=V(I,J)
1270 IF Y<Y1 THEN 1235
1275 IF Y>Y2 THEN 1305
1280 NEXT J
1285 NEXT I
1290 GOTO 1330
1295 Y=Y3
1300 GOTO 1280
1305 Y=Y3
1310 GOTO 1280
1315 *
1320 * PRINT MAP ONE LINE AT A TIME
1325 *
1330 A(1)=1
1335 A(2)=
1340 A(3)=2
1345 A(4)=
1350 A(5)=9
1355 A(6)=
1360 A(7)=A
1365 A(8)=
1370 A(9)=8
1375 FOR I=1 TO 12
1380 B(1)=
1385 FOR J=2 TO 71
1390 Y=(V(I,J)-1)-Y1/(Y2-Y1)+9.1
1395 Y=INT(Y)
1400 IF Y>9 THEN 1430
1405 B(J)=B(J-1)+A(Y)
1410 NEXT J
1415 PRINT B(71)
1420 NEXT I
1425 GOTO 1440
1430 Y=9
1435 GOTO 1405
1440 C=(Y2-Y1)/3
1445 C=Y1+5*C3
1450 PRINT
1455 PRINT REFERENCE CONTOUR=IC
1460 PRINT CONTOUR INTERVAL=IC3
1465 GOTO 735
* *****
* DRILL SECTION
* *****
*
* USES CENTRAL WELL FILE CALLED "WELL"
* FIRST LINE = # OF WELLS(6)

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```

* SECOND TO LINE 46 = WELL ID, X AND Y COORDS, PAY
* DONE,BOD,TJ,COST
1470 DIM U(100),Z(100),C(100),M(100),I(100),L(100),S(100)
1480 P-INT "WHAT IS THE ID NUMBER OF THE WELL YOU WISH TO DRILL"
1485 I PUT Z3
1490 P-INT
1495 OPEN #6 TO :3,INPT
1500 I-PUT :3,41,42
1505 FOR I=1 TO 42
1510 I PUT :3,Y(I),C(I)
1512 P-INT Y(I),C(I)
1515 NEXT I
1520 CLOSE :3
1530 OPEN "WELL" TO :4,INPUT
1535 I-PUT :4,N6
1560 FOR I=1 TO 46
1565 I-PUT :4,U(I),Z(I),C(I),M(I),I(I),L(I),S(I)
1575 NEXT I
1576 FOR I=1 TO 46
1577 IF U(I)=Z3 THEN 1620
1578 NEXT I
1580 P-INT "THIS WELL IS EITHER NON-EXISTENT OR HAS ALREADY BEEN DRILLED FOR OIL"
1585 P-INT
1590 P-INT "WOULD YOU LIKE TO DRILL ANOTHER WELL"
1595 I-PUT A$(11)
1600 CLOSE :4
1605 IF A$(11)="YES" THEN 1480
1610 IF A$(11)="NO" THEN 735
1615 G- TO 1590
1620 J=I
1630 FOR I=1 TO 42
1631 IF Z(I) = Y(I) THEN 1641
1632 G- TO 1642
1641 IF C(I) = D(I) THEN 1645
1642 NEXT I
1643 G- TO 1650
1650 P-INT "YOU DO NOT OWN THIS PROPERTY"
1655 P-INT "WOULD YOU LIKE TO TRY DRILLING SOMEWHERE ELSE (TYPE YES OR NO)"
1660 I PUT A$(10)
1665 CLOSE :4
1670 IF A$(10)="YES" THEN 1480
1675 IF A$(10)="NO" THEN 735
1680 G- TO 1655
1685 G- TO 1705
1705 N:=N6+1
1710 N:=N5+1
1715 P-INT
1720 P-INT
1725 P-INT "YOU HAVE DRILLED WELL NUMBER :J(I)"
1730 P-INT "TOTAL DEPTH DRILLED -----L(I) FT."
1735 P-INT "COST OF DRILLING -----S(I)"
1740 P-INT
1741 IF I(I)>0 THEN 1760
1745 Z'=0
1753 P-INT "YOU HAVE DRILLED A DRY HOLE"
1755 P-INT "BETTER LUCK NEXT TIME"
1759 G- TO 1740
1760 Z'=365+12+Z(I(I))
1765 P-INT "CONGRATULATIONS! YOU HAVE STRUCK OIL"

```

```

1770 PRINT "PRODUCTION IS "I(J)" BARRELS PER DAY"
1775 PRINT "PAY 2345 HAS THE "M(I,J)" FORMATION"
1780 PRINT "RETURN GAIN IS 1-27"
1785 M=M1+27-S(I)
1790 C-USE 14
1795 OPEN "WELL" TO 15,PRINT OVER
1800 PRINT 15,N6
1805 FOR I=1 TO J-1
1810 PRINT 15,U(I),Z(I),C(I),M(I),I(I),L(I),S(I)
1815 NEXT I
1820 IF J=N6 THEN 1840
1825 FOR I=J+1 TO N5+1
1830 PRINT 15,U(I),Z(I),C(I),M(I),I(I),L(I),S(I)
1835 NEXT I
1840 C-USE 15
1845 OPEN X8 TO 16,PRINT OVER
1850 PRINT 16,M1,72
1855 FOR I=1 TO 72
1860 PRINT 16,Y(I),J(I)
1865 NEXT I
1870 PRINT 16,N5
1875 FOR I=1 TO N5+1
1880 PRINT 16,Q(I),E(I),F(I),H(I),J(I),P(I),R(I),T(I)
1885 NEXT I
1890 PRINT 16,U(J),Z(J),C(J),M(J),I(J),L(J),S(J),27
1895 C-USE 16
1900 GOTO 735
1905 END

```

AN OBSERVATIONAL STUDY OF TEACHING: UNDERGRADUATE LEVEL

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[In order for college teachers to be effective in their classroom procedures, there is a need to know which teaching attributes are considered essential. Many research studies have been undertaken to identify these characteristics. Carpenter, Egmond, and Kochem (1965) questioned 125 students as to the teacher traits which they deemed most important. The identified characteristics were grouped into three categories by instructor types. In the study, each student indicated his preference for a pragmatic, authoritarian, or counselor type teacher in a certain situation. The results of preference for each instructor type varied greatly and no single type was consistently preferred as the situation variable changed.

Champlin (1931) asked some 275 college students, who had completed a study of educational objectives, to rank order 35 attributes desired in college instructors. The first five in order of rank were:

- 1) Thorough knowledge of subject matter.
- 2) Interesting presentation of subject matter.
- 3) Interest in the profession.
- 4) Careful organization of the materials.
- 5) Enthusiasm for the work.

Bousfield (1947) reported that 507 university students assigned the following order to 19 items:

- | | |
|---------------------------------|-------------------------------|
| 1) Fairness | 11) Enthusiasm |
| 2) Mastery of subject matter | 12) Wide range of information |
| 3) Interesting presentations | 13) Sense of humor |
| 4) Well-organized materials | 14) Good voice |
| 5) Clearness of exposition | 15) Tolerance |
| 6) Interest in students | 16) Poise |
| 7) Helpfulness | 17) Good appearance |
| 8) Ability to direct discussion | 18) Research accomplishments |
| 9) Sincerity | 19) Reputation as scholar |
| 10) Keeness of intellect | |

Coffman (1954) reported on a study conducted at Oklahoma State University of 50 teachers who were rated by approximately 2,000 students. The rating scale consisted of 18 specific traits with each trait scaled from a high to low evaluation. The results indicated high correlations with: 1) ability to arouse interest in students, 2) sense of humor, 3) feeling between instructor and student, 4) tolerance and liberality, and 5) general estimate of instructor as teacher.

Breed (1977) found no significant differences between the ranking of desirable instructor qualities by some 56 faculty members and 100 of their students.

Trabue (1950) found that 419 liberal arts college presidents selected these teaching attributes as most important out of a list of 26 qualifications:

- 1) Inspires students to think for themselves and to express their own ideas sincerely.
- 2) Is emotionally stable and mature.
- 3) Organizes materials and prepares carefully for each meeting with class.
- 4) Is friendly, democratic, tolerant and helpful in his relations with students.

Later, Stauffer (1956) submitted Trabue's 26 qualities to 281 deans and 526 teachers. The above-named four traits were again rated as most important.

It is reasonable to conclude, based on these studies representing a forty-year period, that desirable traits for college teachers are identifiable, remain basically the same, and can be grouped into specific categories.

STATEMENT OF THE PROBLEM

This pilot study provided instructors with a means of analyzing and evaluating teaching, considering individual teaching styles and teacher effectiveness. It attempted to measure the individual's perception of teaching, as well as the perception of colleagues and students. The procedure offered a process for systematic observation of teaching and an improvement cycle for undergraduate instruction.

The hypotheses developed for the study were:

- HO₁ There will be no significant difference between the pre-test and post-test means on the *Student Description of Teachers - Medium Length - Form (SMF)*.

- HO₂ There will be no significant difference between the means for the total group of participants on the *Student Description of Teachers - Medium Length - Form (SMF)* as perceived by students, colleagues and instructors (self-perception).
- HO₃ There will be no significant interaction between pre-test/post-test and on the *Student Description of Teachers - Medium Length - Form (SMF)* as perceived by students, colleagues, and instructors (self-perception).

SIGNIFICANCE OF THE STUDY

On many college campuses increasing concern for the quality of instruction is being expressed. This has led to a search for better means of evaluating teaching effectiveness both to provide feedback to individual instructors and to reward effective teaching. Also, as an accountability measure, university instructors are being called upon to show evidence of their teaching effectiveness. There remains a need for a simple systematic, easily administered procedure for evaluating instruction. In this pilot study, the researchers have developed an evaluation process and identified an instrument that provides a systematic procedure for meeting this need.

SUMMARY OF PROCEDURES

The following outline provides a procedural summary of the study:

January 14, 1977	Randomly selected participants; N=10. Distributed outline of study.
January 21, 1977	Met with participants to discuss study.
February 7 - 18, 1977	Scheduled individual observations to complete instrument (pre-measure).
February 21 - March 4, 1977	Scheduled conferences with instructors for feedback.
April 4 - 15, 1977	Conducted individual observations to complete instrument (post-measure).
April 18 - 29, 1977	Scheduled conferences with instructors for final evaluation.

The researchers conducted a search for an instrument which would meet the needs identified for the study. Specifically, an instrument that could be easily administered and scored; one which would provide instructional feedback to teachers; and one which would offer an opportunity for instructors to contribute items appropriate for their teaching. In addition, the

researchers were concerned with the amount of time necessary for the evaluation process. The time factor and length of teaching evaluation instruments often become extremely burdensome, difficult to manage, and provide little or no real value for instructors.

The researchers identified the *Student Description of Teachers - Medium Length - Form (SMF)* questionnaire which would meet the criteria for the study. The questionnaire selected was developed as part of a study of teaching and teacher evaluation conducted by the Center for Research and Development in Higher Education, University of California at Berkeley. The scales and items which focus on a description of teaching enable the individual instructor to profile his teaching behavior. The questionnaire categorizes the previously mentioned attributes into general categories. The evaluation questions provide information on the overall perceived effectiveness of teaching practices. It consists of thirty-six items which focus on a description of teaching. These items are grouped into five subscales summarized as follows (Wilson, 1971):

- 1) Analytic/Synthetic Approach (items 1-7) - Has command of the subject, presents materials in an analytic way, contrasts various points of view, discusses current developments and relates topics to other areas of knowledge.
- 2) Organization and Clarity (items 8-14) - Makes himself clear, states objectives, summarizes major points, presents material in an organized manner, and provides emphasis.
- 3) Instructor-Group Interaction (items 15-22) - Is sensitive to the response of the class, encourages student participation and welcomes questions and discussion.
- 4) Instructor-Individual Student Interaction (items 23-29) - Is available to and friendly towards students, is interested in students as individuals, is himself respected as a person and is valued for advice not directly related to the course.
- 5) Dynamism/Enthusiasm (items 30-36) - Enjoys teaching, is enthusiastic about his subject, makes the course exciting and has self-confidence.

STATISTICAL ANALYSIS

Two and three factors analyses of variance were used to analyze the data. The factors considered were:

Time (T)	pre/post test measures
Perceivers (P)	student/colleagues/instructor

Subscales (S)

Analytic/Synthetic Approach
 Organization and Clarity
 Instructor-Group Interaction
 Instructor-Individual Student Interaction
 Dynamism/Enthusiasm

The data were computer analyzed using procedures in the *Statistical Package for the Social Sciences* (Nie, 1975).

SUMMARY OF RESULTS

The study provided instructors with a means of analyzing and evaluating teaching. The questionnaire, *Student Description of Teaching - Medium Length - Form (SMF)*, considered individual teaching styles and teacher effectiveness as perceived by students, colleagues and instructors (self-evaluation). The procedure offered a means for systematic observation of teaching and an improvement cycle for instruction.

Table 1 indicates that all hypotheses were accepted at the .05 level. When the data were analyzed, no significant differences were found between the pre-test and post-test means (HO_1), the means for the total group of participants (HO_2), or the interaction of the pre-test and the post-test means (HO_3).

Table 1

Summary of the Two Factor Analysis of Variance for Total Scores of the *Student Description of Teachers - Medium-Length Form (SMF)* by Time and Perceiver

Source	df	ss	ms	F
Time (T)	1	1.326	1.326	2.053
within error	9	5.813	.646	
Perceiver (P)	2	8.679	4.340	1.128
within error	18	69.268	3.848	
Interaction (TxP)	2	2.096	1.048	.897
within error	18	20.900	1.161	
Total	59	531.298	9.005	

Tables II, III, IV, V and VI represent the summaries of the two factor analyses of variance for scores on each of the subscales of the instrument. No significant differences were found between the means of the pre/post test measures on each of the subscales as perceived by students, colleagues, and instructors.

Table 2

Summary of Two Factor Analysis of Variance for Scores for Analytic/
Synthetic Approach, Subscale I, by Time and Perceiver

Source	df	ss	ms	F
Time (T)	1	.002	.002	.026
within error	9	.673	.075	
Perceiver (P)	2	.105	.052	.211
within error	18	4.435	.246	
Interaction (TxP)	2	.163	.082	.612
within error	18	2.417	.134	
Total	59	32.763	.555	

Table 3

Summary of Two Factor Analysis of Variance for Scores on Organization and
Clarity, Subscale 2, by Time and Perceiver

Source	df	ss	ms	F
Time (T)	1	.204	.204	3.300
within error	9	.557	.062	
Perceiver (P)	2	.650	.325	1.477
within error	18	3.957	.220	
Interaction (TxP)	2	.298	.149	1.404
within error	18	2.576	.143	
Total	59	36.403	.617	

Table 4

Summary of Two Factor Analysis of Variance for Scores on Instructor - Group Interaction, Subscale 3, by Time and Perceiver

Source	df	ss	ms	F
Time (T)	1	.308	.308	2.995
within error	9	.927	.103	
Perceiver (P)	2	.507	.253	1.841
within error	18	2.477	.138	
Interaction (TxP)	2	.210	.105	1.405
within error	18	1.799	.099	
Total	59	16.530	.280	

Table 5

Summary of Two Factor Analysis of Variance for Scores on Instructor - Individual Student Interaction, Subscale 4, by Time and Perceiver

Source	df	ss	ms	F
Time (T)	1	.003	.003	.064
within error	9	.410	.045	
Perceiver (P)	2	.548	.274	1.292
within error	18	3.816	.212	
Interaction (TxP)	2	.006	.003	.157
within error	18	.350	.019	
Total	59	10.965	.186	

Table 6

Summary of Two Factor Analysis of Variance for Scores on Dynamism/
Enthusiasm, Subscale 5, by Time and Perceiver

Source	df	ss	ms	F
Time (T)	1	.020	.020	.169
within error	9	1.064	.118	
Perceiver (P)	2	.487	.243	1.330
within error	18	3.296	.183	
Interaction (TxP)	2	.127	.063	1.139
within error	18	1.004	.056	
Total	59	36.110	.615	

A summary of the comparison by time, perceiver and subscale is presented in Table 7. The analysis shows that the F-ratio of the subscales was significant at the .05 level. The Student Newman-Keuls procedure indicates that subscale #4, Instructor - Individual Student Interaction, is significantly higher than the means of the other subscales.

Table 7

Summary for the Analysis of Variance for Scores on *Student Description of Teachers - Medium-Length Form (SMF)* by Time, Perceiver, and Subscale

Source	df	ss	ms	F
Time (T)	1	.340	.340	2.807
within error	9	1.090	.121	
Perceiver (P)	2	1.811	.906	1.183
within error	18	13.782	.766	
Interaction (TxP)	2	.345	.172	.727
within error	18	4.252	.236	
Subscale (S)	4	12.396	3.099	7.509*
within error	36	14.856	.417	
Interaction (TxS)	4	.198	.049	.690
within error	36	2.540	.071	
Interaction (PxS)	8	.484	.061	1.039
within error	72	4.194	.058	
Interaction (TxPxS)	8	.459	.057	1.064
within error	72	3.883	.054	
Total	299	145.350	.486	

*p < .05

DISCUSSION AND SUMMARY

Since there were no significant differences between mean scores on the pre/post measures as perceived by students, colleagues, and instructors (self-perception), the results infer that the time factor between the pre/post measure may not have been adequate. There may be a need for a longer period of time in which participants reflect on feedback and effect changes in methodology. Also, there may be a need for more conferences with participants

to analyze and provide continued focus on the improvement cycle.

Individual conferences conducted with the participants after the pre-test were received favorably by the instructors. All stated that the procedure offered constructive feedback for improving their teaching. Nine of the ten participants stated they would like to continue to use the procedure, indicating that the conferences had personal value for them. All participants indicated they were dissatisfied with the present teacher evaluation procedure. It is incomplete, offers no concrete suggestions for improvement and is based solely on student perceptions.

Each individual conference was conducted using the following organizational structures:

- 1) Positive reinforcement.
- 2) Constructive comments based on pre-test results.
- 3) Development of improvement cycle.
- 4) Positive summary of experience.

The researchers were very much aware of individual levels of anxiety demonstrated by the participants during the observational and conferencing procedures. These were discussed openly with the participants and appeared to subside as the study progressed.

The mean scores of the pre-test measure as perceived by students, colleagues and instructors differed by less than .5 of a point. This finding suggests a similar perception of teaching on the part of all three perceivers. At a time when universities are using student evaluations as a measure of teaching, this may suggest that students' perceptions of teaching are comparable to colleague and instructor (self) evaluation. This finding is supported by the research compiled by Breed (1977). One could also reason that student evaluations of teaching may be a wasted effort. Since the mean scores on the pre-test between the three groups (i.e., students, colleagues, instructor) were comparable, one could infer that colleague and instructor (self perception) evaluation would serve the same purpose. However, two sets of data would tend to validate the procedure.

Another factor to be considered is that students often reason that they will be more successful in the classroom if they can develop a personalized relationship with the instructor. The reciprocal could also be true for faculty. Since many universities are using student evaluations to measure teaching, faculty may encourage closer student relationships to achieve a higher student evaluation. Further study is needed in these areas.

Four subscales of the questionnaire which deal with different characteristics of teaching were not found to be significant. The first two measure a teacher's ability to analyze, synthesize, organize and clarify subject matter. The third subscale measured an instructor's ability to interact with the total class. Subscale five was concerned with the instructor's

personal traits.

Subscale four, Instructor - Individual Student Interaction, was found to be significantly higher than the means of the other subscales. This finding could be a direct result of emphasis placed upon competency based teacher evaluation (CBTE) by the College of Education at Memphis State University during the past five (5) years. It could also be a direct result of the current interest and effort in designing individualized, student-centered teaching approaches by these instructors involved in the study. Most of the participants in the study are advocates of individualized programs and use them in their teaching.

To conclude, the study offers a procedure for analyzing and evaluating undergraduate teaching. The participants indicated they were pleased with the organization and personal value they received during the study. The results offer additional considerations and present new questions concerning the process of measuring teaching. There remains an urgent need for continued research in this area.

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DEVELOPMENT OF GRAPHIC CONCEPTUAL TOOLS APPLIED TO URBAN PLANNING PROBLEMS

Subbarayan Prasanna, Department of Planning¹

This project was developed to provide specific visual aids material to help in conceptualization of analytical problems in urban and regional planning. The material developed is in the form of analytical graphics dealing with several stages and sequences of decision making in urban planning problems. The graphics are formulated with accompanying annotations in such a manner as to enable being evolved into a monograph, regarding an aspect of the curriculum for the Master's degree in City and Regional Planning. The material produced is therefore illustrative of the available techniques for application in professional and research pursuits.

In addition, it is hoped that the material will assist in the development of conceptual processes to secure and integrate thoughts/idioms conducive to a set of objectives in an organized manner and communicable format in planning situations.

INNOVATIVE ASPECTS

The graphics produced emphasize the interpretation and adaptation of professional and research work examples suitable to the classroom medium of instructional discipline. Past experience, over several years, indicates that a large area of development in conceptualization is lost on the students due to lack of exposure to the graphic medium. This is especially acute in the case of planning curriculums as they start the professional education at the graduate level, drawing students from several undergraduate backgrounds, some professional and others non-professional. A main problem is faced in the integration of techniques with professional objectives. Another lies in the area of development and evaluation of appropriate techniques themselves. A third is observed in the formulation of analytico-synthetic approaches. Fourthly, the most important problem lies in bridging the gap between the perception of morphological changes in planning environments and the rationalization of policies implemented on such environments.

¹Valuable assistance was provided by Ms. Beth Cooper in conducting this project.

The graphic material produced in this project is being developed into a monograph. This monograph is expected to serve as a reference volume for students in the Planning program, as well as provide visual aids to instructional material in several courses in the planning curriculum.

THE PROJECT

This project derived and used material from a number of professional, research and academic activities in which the author and several of his colleagues have worked during the past eight years. Their locales included several regions in and outside the United States.

The following is a list of major projects from which the graphics were developed. These are divided broadly into 1) Research and demonstration studies supported by grants in aid and 2) Professional studies undertaken to help decision making by specific clients.

Research and Demonstration Projects

- 1) *The Bellingham Project*: Investigation of Urban design elements within the comprehensive planning process in Bellingham, Washington, with a view to demonstrate conceptual and operational possibilities of urban design efforts for towns of equivalent size and population characteristics. This project was funded by the United States Department of Housing and Urban Development under title 701 (b) program and amended to the University of Washington, Seattle. The project was completed in the year 1969-70.
- 2) *The Ham-Mond Project*: Investigations of form determining forces in two typical towns of the Northwest to demonstrate the conceptualization of process-form relationships in an environment of public policies, growth patterns and options of spatial accommodation were undertaken. The project was funded by the National Humanities Foundation in 1970.
- 3) *The Urban-Coastal Region Project*: A curricular laboratory in graphic analysis developed on the empirical conditions of the urban coastal region of the Puget Sound - summer and fall 1974, at the University of Washington, Seattle. The project was supported by a Mellon grant.
- 4) *The Columbia Basin Investigations*: These were primary and secondary materials of information that developed over several years in the Columbia River Basin of the Pacific Northwest. A part of the investigations resulted in a Ph.D. dissertation at the University of Washington dealing with transformations in the settlement patterns of towns and regions in the Basin in 1975.

Academic Abstractions out of Professional Experiences

- 1) *The Sentinel New Town Project, Western Australia:* Investigations of conceptual options of spatial forms and land use inter-relationships suggestive of the three-dimensional outcomes related to a mining settlement project in the deserts of western Australia.
- 2) *A large, "New town-in Town" Project in Kakaako, a sector of Honolulu, Hawaii:* Investigations of conceptual options of spatial forms and land use inter-relationships, and structural stereotypes of accommodation in a planning and design perspective of 30 years, identifying alternative means of sequencing the achievements/targets over the time perspective.
- 3) *Dyersburg Project, Tennessee:* This project is in process. It deals with the investigations of impact possibilities of the new freeway I-55 and bridge across the Mississippi River on the town and the county. Long-term and short-term projections are being made and analyzed as to the impact on several sectors and interests in the communities.
- 4) *Kansas City, Mo./Brunswick, Ga. Multimode Transportation and Utility Corridor Project:* This project is just beginning now. The project is aimed at developing analytical procedures to help the states of Missouri, Arkansas, Tennessee, Mississippi, Alabama, Georgia and Florida in planning to develop a comprehensive transportation corridor across several regions from Kansas City to Brunswick, a distance approximately 1,200 miles through several urbanized, amenity, resource, agricultural, recreational regions and metropolitan industrial concentrations. Several interesting graphics are expected to result from this project. No project of this type and scale has been undertaken before in planning in this country.

The resulting graphics have been formulated into five areas of interest in planning analysis. These areas cover 1) goal-form interactions, 2) schematics of end-states rationalizations, 3) process-form relationships, 4) time perspectives and growth pattern perceptions, and 5) dimensional analysis of decision sequences. Figure 1 presents a summary view of the typical graphics derived from each of the aforementioned planning studies.

The comprehensive efforts of this project carry over from those of several years in the past. Many students, faculty members and professional planning consultants have contributed to this directly and indirectly. A major part of the effort was achieved in Seattle during the years 1974-75 and was supported by a faculty development grant from the Mellon Foundation. The present effort is supported in part by the Center for Instructional Service

PART II

DEVELOPMENT OF NEW COURSES

INTRADISCIPLINARY COURSE: LANGUAGE AND PERFORMANCE STYLES

Lea Queener, Department of Speech and Drama

Language and Performance Styles was conceived as an intradisciplinary course required of all Speech and Drama graduate students to meet three departmental needs:

- 1) Perceived relationships between the area disciplines which make up the structure of the department - theatre and oral interpretation; rhetoric and public address; radio, TV, and film. Although these conglomerates are all dedicated to the exploration of the values, functions, and influences of the symbolic image as it relates to the fundamentals of human life, increased area specialization over the last decade has promoted minimum integration - rather, isolation. Many graduating Master of Arts students take jobs in small colleges where they are expected to function in breadth rather than impractically circumscribed specialities and find themselves unfamiliar with the various terminologies, sources, and methods of the several areas they are required to act within.
- 2) Demonstrated relevance between research methods and research content. Two courses in research methods were being taught, in theatre and in communications, which students found tedious, excessive, and often irrelevant to their interests. They complained of "busy" library work which seldom related to their course work or career goals.
- 3) Establishment of a community of scholars and performers, both faculty and students. Many of the faculty and students did not know their colleagues and peers in other areas, nor their interests, expertise, and achievements.

Language and Performance Styles was conceived as a course which would demand that the student explore and relate the fundamental and common element of theatre and communication arts - language - from the points of view of the various contexts and functions of the department's areas and which would at the same time give him increased motivation to apply research methods to his interest areas. And by bringing faculty and students from the various areas

together for a common study, it was believed that a departmental community would flourish.

DESCRIPTION

The course is predicated on the notion that all language is performance, and all performance, language; it defines language as "the image in performance," that which speaks - the word, the body, and the environment. Such speaking images were examined in the art of performer: 1) the verbal image; 2) the body, or gestural, image; and 3) the environmental image, including the electronic environment. Each type of image was explored as it functions in performances on the stage and platform, in the electronic media, and on the written page.

All graduate students were required to take the course, with the exception of those who had already completed one of the research methods studies. With 41 students enrolled, the course was team taught by Leonard Lee (radio, TV, and film), Michael Osborn (rhetoric), and Lea Queener (theatre and oral interpretation), with 17 other faculty members of the department participating in one or more of the class sessions. Lea Queener served as course coordinator.

A summary outline of the class calendar suggests the course content:

Sessions

- 1 - 3 Professional resources: organizations, journals, and library holdings were explored. The research paper was discussed in structure and style.
- 4 - 9 The verbal image - theories and approaches: lecture and discussion developed theories and approaches to the symbolic image, making use of Susanne Langer, Benjamin Whorf and his followers, Kenneth Burke, the phenomenologists, and Noam Chomsky.
- 10-12 Nonverbal languages: gesture and mime; space-time, visual-aural, and environmental forms. Lecture and discussion was augmented by demonstrations, slides, and videos.
- 12-14 Film language: Point of view, composition, montage, and process were examined in videos of *David and Lisa* and "The Making of a Documentary."
- 15 Organization of a class project to translate Auden's poem, "The Shield of Achilles," into video language - to be completed by the semester's end.

Sessions

- 16-20 The dramatic play: scenes from *Macbeth*, Pinter's *The Homecoming*, and Hakim's *The Tree Climber* were presented in the styles of stage, readers theatre, solo, and film. The same scene from *Macbeth* was presented in each of the four media and discussed in terms of the verbal and nonverbal language functions previously explored. Scenes from *The Homecoming* were viewed in the styles of stage, readers theatre, and solo, with Walter Smith and Jerry Chipman as guest performers.
- 21-23 The public speech: Martin Luther King's "I've Been to the Mountain Top" was heard and discussed, with particular emphasis on the clash between the images of King's and Memphis' environments. The rhetoric of systems (i.e., diplomatic and institutional) and media was then explored.
- 24-26 Comparative forms: image transformations occurring between the novel, play, and film forms were explored with Kesey's *One Flew Over the Cuckoo's Nest*.
- 27-28 The poetic image: Auden's "The Shield of Achilles" was examined as poem and video presentation.
- 29 Final assessment and celebration: an evening of discussion and reviews of student papers preceded the final examination.

Student assignments included specific readings in the image content and structure of the diverse areas, three major research papers (one of which was focused on comparative forms and functions), and participation in the class performances and video project.

Procedures

The course met on Tuesday and Thursday afternoons, 4:30-6:00, in order to avoid class and production conflicts. The media room of the Speech and Drama building, with its platform and video system, met most of the course needs, although an occasional move was necessary (e.g., the department's Studio Theatre for *The Homecoming* and the Memphian Theatre for *One Flew Over the Cuckoo's Nest*). A location trip to the Mason Temple for consideration of Martin Luther King's speech was planned but did not materialize.

Class format consisted of lectures, panel discussions, and performance images which became the subject of class discussion. Professors Lee, Osborn, and Queener were present at all sessions and attempted to provide continuity through the succession of visiting lecturers, discussants, and performances.

Materials

Fifty books selected from all areas were placed on reserve, with five ordered for student purchase. Hand-outs included extensive area bibliographies (often annotated), listings and descriptions of the many professional organizations of the diverse areas, programs and scripts, and occasional summaries. Videos and slides were generally selected from the departmental and individual faculty holdings (excepting *One Flew Over the Cuckoo's Nest*, which required special arrangements).

Faculty

Guest faculty included Professors Acey, Bakke, Baster, Bensman, Gantt, Gee, Helming, Koertge, McFaddin, Malin, Sloan, Smith, Strickland, Swanson, Ranta, White, and Yellin - all in the Speech and Drama Department. The three full-time instructors met weekly to discuss course plans, projects, and problems; and Lea Queener met with visiting faculty members for briefing on the preceding lecturers and activities and objectives of their own presentations in the course, with an attempt at coordination of theme and terminology.

Evaluation

At the end of the semester a meeting between three students and interested faculty was held to discuss the course and suggest ways to solve its problems. A formal evaluation involving all students was planned for the spring semester but did not materialize because the course coordinator was away on leave of absence.

Of the 41 students who enrolled, 29 received final grades: 12-A, 11-B, 4-C, 1-D, 1-F; 5-Drop, 7-Withdrawn. Class attendance for those who remained in the course was generally good.

Values

- 1) Both students and faculty were exposed to a variety of materials and perspectives spanning the whole of the departmental areas. Terminologies, relationships, and the problems and possibilities in coexistence of the diverse areas were explored. Students who go to jobs where they are expected to teach courses in areas other than their specializations will have materials and insights with which to begin their preparations.
- 2) Better understanding and cooperation was apparent among both students and faculty, many of whom had not previously known each other.
- 3) Deficiencies in background, as well as strengths, of new graduate students were quickly apparent to a wide spectrum of the faculty.

Problems

- 1) The late afternoon hour created a poor psychological environment for a high pressure course.
- 2) Because all graduate students who had not previously completed a research methodology course were required to enroll in Language and Performance Styles, part of the enrollment consisted of students who were in their last semester of graduate work and who resented having to forfeit a last elective to a departmental requirement. In general, the absolute nature of the required course status was a strong negative force.
- 3) Too much was attempted; too much was done; too many faculty members were included in the course; too many topics were considered. Consequently, the focus was dispersed, discussions were sometimes too elementary, and the rush of topics and faculty led to frustration and discontinuity. Although it was hoped and urged that all participating faculty attend all classes in order to achieve the desired goals, a busy departmental schedule prevented that achievement. The efforts at preliminary briefing before a visiting lecture or panel discussion seldom succeeded in establishing the continuity of theme desired; thus establishing relationships and cross-referencing between the areas was sometimes difficult. And the crowded class calendar seldom allowed enough time for clarification and pointing out connections by the team instructors, of questions from students.

It should be noted, however, that in spite of the above major problem, an inherent corollary value emerges in discovering what will and will not work, what deletions need to be made, and which faculty function best in such a course environment.

- 4) Because class time was not available for pursuing problems with research methods and writing style, extensive conferences with students were necessary with every writing assignment, thereby creating problems for everyone. Students who were advised to seek help from remedial sources in the English Department were too busy with departmental productions to do so.

FOLLOW UP OF THE PROJECT

The team instructors continue to believe the course has valuable potential and is worth pursuing. The establishment of the new College of Communication and Fine Arts offers additional possibilities which have yet to be explored. In the meantime, tentative plans have been made for offering the course again in the fall semester of 1978, with the following implementations:

- 1) Offer the course as an elective rather than a requirement.
- 2) Addition of a one-hour laboratory per week for those who are deficient in writing and research skills.
- 3) Schedule more time for class discussion, breaking occasionally into small interest groups for special examination of the performance images experienced together.
- 4) Realistic parameters in the scope of the course. Although there are apparent values in exposing incoming graduate students to the many areas and expertise in the department, the difficulties outweigh the values at this time. Greater focus should be given to depth exploration of key issues by faculty who can sustain the course continuity.

CONCLUSION

The excitement generated by the course concept and its possibilities led to a proliferation of ideas and plans in an effort to accommodate the multiple interests of the department. The course represents a truly cooperative effort. In the future, however, firmer leadership must be asserted, with a more modest thrust into the cosmos of language and performance styles.

COMMUNICATION SKILLS FOR GRADUATE STUDENTS IN THE COLLEGE OF EDUCATION

John H. Sloan, Department of Speech and Drama

This past summer (1976), Dr. Robert Saunders, Dean of the College of Education, asked me to meet with his Department Heads to pursue the possibility of a special course in communication skills for graduate students in the College of Education.

There was virtually unanimous agreement that many graduate students in the College were deficient in such basic communication skills as information management, extemporaneous presentation, management of questions and answers, and a variety of nonverbal communicative skills, including body language. Indeed, the only substantive debate over the need for such a course dealt with two issues:

- 1) Would one course be adequate to cover the large number of problems perceived?
- 2) Could the course be broadened in scope to include M.A. candidates as well as doctoral students?

The meeting concluded with the consensus that a 7000 level graduate course in communication be developed and implemented spring semester, 1977, using an existing Speech & Drama course as a pilot basis. I agreed to develop and teach the pilot section, with the understanding that additional courses would be considered in the future if things worked well.

This past fall a formal proposal was submitted for a Seed Grant to Facilitate Learning to the Center for Instructional Service and Research of Memphis State University dealing with the proposed new course in education. The proposal, in the amount of \$1,000, was approved.

A course syllabus was developed along the guidelines suggested in the proposal for the grant. Twenty-five memorex audio cassettes were purchased for student use in the course - the concept being that students would have a personal record of their competency during the beginning, middle, and end of the course. Funds for this purpose were provided by the Center. Recording equipment was to be provided by the Department of Speech & Drama. Additionally,

the Department was to videotape the final performances of the students, which could be purchased by the students at cost (approximately \$20.00 each for color cassettes). Reading materials and a bibliography were prepared which were to be provided by the Department. Secretarial funds provided by the Center were applied to these functions.

When the Spring Schedule was developed last fall (1977), Dean Saunders and I agreed that Speech 7933, Seminar in Problems in Speech Education, would be the most appropriate course title for the pilot section. We scheduled the course at a time we thought would be popular - 4:30 to 6:00 p.m. on Tuesdays and Thursdays. I was listed as teacher of record and planned to teach the course as a self-imposed overload.

Much to my personal disappointment, the course did not make. Only one person signed up and was assigned to another graduate course in communication. (Interestingly, she was not clear as to the nature of the course she had originally signed up for - it apparently was scheduled at a convenient time.)

While it is difficult to pin-point the reasons for the demise of the course, I plan to take the following steps to guarantee that it gets a fair test in the future (possibly this summer - more likely next fall).

- 1) The course title may have been misleading. Perhaps 7993 (Special Problems) with a specific published course description would be more popular.
- 2) Clearly, the nature of the course needs more promotion by the College of Education. I plan to visit the Department Heads, and even more vital, with key advisors to describe the nature and function of the course.
- 3) Finally, I am personally convinced that, once taught, the course will be a useful and popular elective in the College of Education. I will submit a follow-up report when the course becomes a reality.

PART III

TEACHING INFORMATION PROCESSING
SYSTEM (TIPS) APPLICATIONS

TIPS IN CHEMISTRY 1111

James E. Bulger, Department of Chemistry

Approximately 300-500 students enroll each semester in Principles of Chemistry (Chemistry 1111-2) with the majority coming from the pre-medical, biology, and engineering areas. A large number of these students apparently find general chemistry difficult. Approximately half of the students originally enrolled in the course either withdraw or fail. It is generally thought the cause of many of these "failures," as well as underachievement by other students, is insufficient time spent on the application of lecture material to problem solving.

The Teaching Information Processing System (TIPS) developed by Allen C. Kelly seemed to provide an appropriate device for improving student performance. The system as originally developed provides computer programs to process multiple-choice quizzes taken by the students. In addition to grading the quizzes, TIPS provides output to each student in the form of a message from the professor based upon the student's performance on the quiz. A summary of class performance is also provided to the professor. This system was used in two sections of Chemistry 1111 in the fall of 1976 by Dr. Bulger. Multiple-choice quizzes were given at weekly intervals, except when major exams were scheduled. The quizzes consisted of four to eight questions and/or problems. After the quizzes were graded, individual messages were returned to each student. Students who scored 100% on the quiz were congratulated and credited with one point towards their final grade. Those who performed poorly or were absent were admonished and assigned problems based on the questions missed on the quiz. When these assigned problems were turned in, one point was credited toward the final grade of that student. In this way it was possible for all students to receive credit by either achieving 100% on the quiz or by completing the problem assignment. Seven quizzes were given and nearly all students turned in assigned problems.

Student response to TIPS was excellent. Many students stated that mandatory problem assignments were beneficial to them and that they would not have done the work otherwise. The students' attitude toward both the course and the professor also seemed better, perhaps because of the increased interaction. Many students also expressed disappointment that TIPS was not being offered in Chemistry 1112. (A TIPS program is presently being compiled for Chemistry 1112 - thanks to the support from the Center for

Instructional Service and Research.)

Whether class performance was actually improved is difficult to determine. As judged by final examination grades, it was not possible to draw any firm conclusions. The two sections that utilized TIPS were sections six and seven of Chemistry 1111. Section six outperformed all other sections on the final examinations and generally had a more positive attitude towards TIPS, the course in general, and the instructor. Section seven, an evening course, did slightly below average on the final examination and had a slightly less positive view towards TIPS and the instructor. In any case, the students claimed to have studied more. According to a survey carried out by Mr. Charles Hart ("Student Attitudes Towards TIPS - A Computer Based Instructional Technique"), the students felt that they had studied more consistently in Chemistry 1111 and that the mandatory assignments probably had a salutary effect on the students' study habits.

TIPS will be offered in Dr. Bulger's Chemistry 1111 section in the fall of 1977 with several modifications aimed at simplifying bookkeeping of problem assignments and mechanics of the computer access.

THE USE OF TIPS IN PHYSICS 1111

Robert R. Marchini, Department of Physics

The TIPS system was used in Physics 1111, Foundations of Physics, in the fall semester, 1976, and again during the Spring semester, 1977. Physics 1111 is a conceptual type physics course which uses multiple-choice examinations. The enrollment in the fall semester was 104 students, and there were 120 students enrolled in the spring semester.

There were nine surveys given during the semester and each survey covered three or four concepts. The surveys were computer graded and the learning prescriptions were returned to the students by way of a mailbox located outside the physics auditorium.

The evaluation of TIPS as an aid to the students is not straightforward. On one hand the students strongly felt that TIPS was a valuable program and should be continued. In fact, 85% of the students felt TIPS was helpful. Eighty-four per cent said that the weekly surveys were worth the loss of lecture time and 91% said the system helped them find their strengths and weaknesses.

Despite these student opinions, there was no detectable improvement in student performance. The student performance on major exams was approximately the same as before TIPS. Student attendance was the same. (Students did not seem to make a special effort to come to class on survey days.) The failure-withdrawal rate with TIPS was up slightly over the failure-withdrawal rate without TIPS. The increased failure-withdrawal rate might be explained on the basis that the students had more feedback on their lack of progress in the course and thus knew enough to drop the course.

The benefits of the course may be summarized as follows:

- 1) TIPS makes dialog possible between the teacher and every student in a very large class.
- 2) It forces the teacher to organize his course and examine his text. The course must be broken into digestible units.
- 3) The students like it and it helps their confidence to know such a system is being used for their benefit.

- 4) Some students benefit from the system. They feel their performance on major exams was improved by TIPS.
- 5) It is a low cost way to keep track of students in the course. It would seem to be a much more cost effective method of using a computer in education than a system which would require extensive hardware to enable the students to carry on a dialog with the computer.
- 6) Most students are incapable of diagnosing their own weaknesses in a course. Through TIPS the teacher is able to diagnose each student's weaknesses and recommend an appropriate course of action.

The deficiencies in the TIPS program can be summarized as follows:

- 1) Some students claim the method is too impersonal. They resent being told that they are deficient in statements prepared before they had graduated from high school. I do not feel that this is a valid objection to TIPS; it is certainly no more impersonal than dialog methods, such as PLATO, since these prescriptions also were written in advance by their teacher. Secondly, from long experience in teaching this course no more than three or four per cent of the students ever seek help.
- 2) The disparity between good students and poor students seems to be increased. The good students take advantage of the system and improve, while the poor student ignores the prescriptions.
- 3) The program seems to use computer storage in a very inefficient manner.
- 4) The manuals furnished are not as helpful as they might be. The system seems full of little cliches that are not explained in the manuals.

In conclusion, TIPS seems to provide a useful service for the students, but the question still remains as to whether or not it is worth the time of the teacher to implement it. It would seem that further testing of the system by other instructors will be necessary before that question is resolved.

TIPS IN PRINCIPLES OF ECONOMICS I

Michael J. Gootzeit, Department of Economics

TIPS, or Teaching Information Processing System, is a computer based method of instruction, which is designed to help administer large "principles-type" classes of between 50-600 students. Frequently, students feel a lack of contact with the instructor and the material because of the size of such classes and the lack of familiarity with the material. The TIPS program corrects this problem in an extremely effective fashion.

In the application described here the system provides "feedback" based on the nine surveys or quizzes the student takes during the semester. This feedback is in the form of "learning prescriptions" and is tailored by each instructor to each specific survey. First, the survey is taken; it is constructed in multiple-choice format so it can easily be computer graded; a response sheet is handed back to the student after each survey. This feedback sheet lists correct responses to the survey versus actual responses made by the student; it then states corrective actions for each wrong answer. These are the prescriptions which were prepared in advance by the instructor and programmed into the computer. The surveys and each separate response sheet form a convenient record of the course for the students; they can be used to study for full period exams and also to review the course in the future. TIPS was first applied at MSU to economics principles courses during 1975 by David Ciscel; it was then applied by Michael Gootzeit (the current author) during fall 1976 and spring 1977. Professor Ciscel applied TIPS to Principles II (Econ. 2120) and Professor Gootzeit applied TIPS to Principles II (Econ. 2110).

The fundamental importance of TIPS is its quality as an organizational tool. It helps beginning economics students by offering: 1) a clear list of weekly reading assignments, the knowledge of which is required for the upcoming survey; 2) a review of recent class material in the form of a weekly survey which "encourages" studying; 3) feedback from instructor to each student. If a student takes all the nine surveys and keeps a record of the correct answers and also keeps a record of the learning prescriptions he receives back for each survey, he will have an excellent course record, which can be used effectively to study for each full period examination and for the final. It can also be used in the future as preparation for standardized economics examinations such as those administered by the "College Entrance Examination

Board," for entry into graduate school.

Besides providing reading assignments, the current author provided an "Organization of TIPS," which described the overall system and helped explain the grading system. He also provided a "Basic Course Outline" which divided the subheadings of the "Basic Course Structure" into two through four major elements. This was provided to the student as a guide for studying the text and as a handy tool for reviewing notes taken in class before each full period examination.

The rationale for applying TIPS to economics principles is that:

- 1) Economics is considered one of the most difficult fields in the Business School, especially at the "principles" level. Large numbers of students have problems with the beginning course and either drop it or take a low grade. Furthermore, the beginning two-semester principles courses are required for all majors in the College of Business Administration.
- 2) The large lecture classes in the principles courses average about 100 students, and a better form of administration is required for these courses. Improved management of the course should result in improved learning.
- 3) TIPS requires, once implemented, a minimum of attention, and it therefore helps both students and faculty.

Students learn more material in the same length of time and the faculty is encouraged to concentrate on the more difficult aspects of the instructional material. Furthermore, constant feedback from students is received in the weekly survey quizzes and the student received prepared responses each week from faculty, via the TIPS computer program. This TIPS project, as well as one carried out simultaneously by Professors Bulger (Chemistry Department), Marchini (Physics Department), and Ciscel (Economics Department), was evaluated in a report: "Student Attitude Toward TIPS - A Computer Based Instructional Technique," by Charles K. Hart, graduate assistant, Center for Instructional Service and Research, MSU, March 1977 (mimeoed). This report was based on a questionnaire filled out by the students in these various principles classes which had used TIPS during the fall semester 1976, and it was administered one week before the end of class.

The result of this evaluation illustrated that "student attitudes towards TIPS were generally positive." But, it was not clearly demonstrated that "more consistent study arose from exposure to TIPS in all courses. In order to motivate such study, Professor Bulger assigned additional problems for handing in, "according to the number of incorrect responses on the surveys." This is a significant result which should be used by subsequent users of TIPS in the classroom.

The current author utilized TIPS once again in Economics 2110, during spring 1977 with similar results to those just described. He wishes to next apply TIPS to another required course for majors in the College of Business Administration: Money and Banking. This course is somewhat similar to Principles I, but it is more detailed and theoretical; hence, it requires more attention, and it would be useful to the students to apply the TIPS organizations scheme.

PART IV
VIDEO TECHNOLOGY APPLICATIONS

THE DEVELOPMENT AND USE OF COLOR VIDEOTAPES
AS A MEANS OF BRINGING LOCAL EXPERTISE INTO THE CLASSROOM

Donald A. Dellow, Department of Foundations of Education

The particular activity of this project was designated for the Department of Foundations of Education graduate course entitled, "Adolescent Psychology Applied to Education." (EDPS 7112/8112) The bulletin description of the course is as follows:

7112-8112. Adolescent Psychology Applied to Education. (3)
Advanced academic and laboratory study of the psychological environments of adolescents. Particular emphasis is placed on behavioral antecedents and consequences in adolescents as these relate to secondary school personnel or others who work with adolescents.

In essence, the course was designed and is presently being offered primarily for secondary education majors and counseling and guidance majors.

Generally the course is offered in the evening to allow those students employed during the daytime an opportunity to take the course. This works out well for the convenience of those needing the course in their program, but the time the class is scheduled (6:30-9:15 p.m.) generally obviates against any kind of a laboratory experience as described in the graduate bulletin. The purpose of the laboratory experience in the course was to allow for students to develop first-hand experience with local "expertise" and services that related to adolescents. On several previous occasions, outside speakers were invited to the campus to share their views with the students. This activity was as close to a "laboratory experience" as could be formulated. The students responded favorably to this more "applied" portion of the course. A myriad of factors made it difficult, however, to get the speakers when they would be of most benefit. In addition, there were numerous problems with cancellations.

PROJECT PURPOSE

It was the object of the project to supplement the content of the EDPS 7112/8112 course with color videotapes that would provide current local perspectives

on adolescent characteristics, problems, advice to educators, and descriptions of related local services. It was assumed that local "experts" would be willing to be videotaped in an interview situation and/or a live class presentation. The videotapes would serve to give Memphis State University students enrolled in EDPS 7112/8112 a current picture of certain adolescent problems as well as some indication of possible remediation activities and resources.

PROCEDURES

- 1) A graduate assistant was trained in the use of the color videotape equipment and advised of the procedures for working with the Instructional Television staff of Center for Instructional Service and Research in taping interviews in the studio.
- 2) A series of tentative high-interest topics was identified, local "expertise" contacted, and tentative arrangements made with speakers. The following list represents the presentation topics and activities videotaped for the project.
 - a. Workshop on Human Sexuality (8 hours)
 - b. Music and Adolescents (2 hours)
 - c. Sex Education (2½ hours)
 - d. The Memphis City Schools Drug Education Program (2 hours)
 - e. Children Being Assessed on the Concept Assessment Kit (2 hours)
 - f. Videotaped Episodes of Young Children (2 hours)

Total 18½ hours

- 3) The videotapes were utilized in graduate and undergraduate classes during the spring 1977 and summer 1977 semesters. Formal and informal student reactions were obtained from the students previewing the videotapes.

EVALUATION

The evaluation of a project such as this one is of necessity a combination of the reactions of both the instructor and the students. The evaluation will thus provide the views of sponsoring faculty member as well as the formal and informal reactions of students.

Student Evaluation

In the spring semester 1977, the faculty member utilized the Purdue Teacher Evaluation service provided by Memphis State University. The Purdue instrument was administered to the graduate class in adolescent psychology and

contained three questions that were included to evaluate the four videotapes that were viewed by the class. The class members were specifically requested to answer the three questions on the basis of their reactions to the videotapes. The three questions and the student response frequencies are provided below:

	SA	A	U	D	SD
"The guest speakers contribute significantly to the course."	10	14	3	1	2
"The speakers who addressed us communicated effectively."	11	15	1	0	1
"An appropriate number of outside lectures was used."	7	15	2	2	4

Although the questions do not relate to any technical qualities of the videotapes, they do reflect the practical consideration of whether the students thought they contributed effectively to the course content. The results of the three questions are interpreted as offering positive support for the videotaped topics and the speakers involved. The combination of "agree" and the "strongly agree" responses accounts for a minimum of nearly seventy-five percent of the students.

In the first summer session 1977, one of the videotapes was utilized as part of the course content of the graduate course EDPS 7112/8112. After viewing the tape, the students were asked to respond to three questions. The responses given by those students are reported below:

1) The videotape was:

	<u>N</u>	<u>%</u>
Very interesting	6	21
Interesting	19	68
Undecided	1	4
Boring	2	7
Very boring	0	0
	<u>28</u>	<u>100</u>

2) The videotape was:

	<u>N</u>	<u>%</u>
Very valuable	4	14
Valuable	22	78
Undecided	1	4
Of little value	1	4
Of no value	0	0
	<u>28</u>	<u>100</u>

3) I would recommend:

	<u>N</u>	<u>%</u>
Continued usage of tape in class	27	96
Discontinue usage of tape in class	$\frac{1}{28}$	$\frac{4}{100}$

Clearly, the vast majority of students responded to the videotaped presentation positively. The students perceived the tape as valuable, interesting, and recommended its usage in the class.

Another dimension of student response to the videotapes is provided by the informal responses of both graduate and undergraduate students who have viewed the tapes in class or independently. Students have offered very positive responses and particularly comment on the interesting information about local services and adolescents. Several of the videotapes have been requested by students for independent viewing after hearing about their value from fellow students.

In summary, the student response to the videotapes has been very positive and encouraging. Students seem to view as good educational practice the use of videotaped presentations.

Instructor Evaluation

It was originally intended in this project that videotapes would be made of interview situations where the instructor and the invited guest would follow a script containing specific questions. In discussing this idea with guest speakers, it became obvious that this was not the preferred format. Consequently, it was arranged for the speakers to make presentations to the graduate class and have them videotaped "live" in the ITV studio. This procedure was utilized for three speakers and accounted for approximately seven hours of videotaping and was ultimately the most successful activity in terms of usable videotape footage.

In an effort to take advantage of a timely and relevant seminar on campus, arrangements were made to videotape several of the major presentations. Although a total of eight hours of videotape was made with black and white portable equipment, the net result of usable footage was a one-hour videotape.

It is evident from that experience that many seminars, symposia, and workshops do not lend themselves to videotaping. Speakers tend to have an informal style that works well for interacting with workshop participants but does not provide very interesting videotape replay.

Anyone who has arranged for "live" guest presentations in class knows that there is a risk of the sessions going badly. A heuristic benefit that accrued from this videotaping project was the ability of the instructor to know how the presentation was going to go before class. The instructor could select and present only the best of his taped sessions to the class. In fact, with editing, the presentations can be tailored to very specific needs. This is considered to be one of the outstanding benefits of using videotaped presentations.

The instructor feels the videotapes did provide interesting and relevant content to the class sessions. The previously reported student responses and the nonverbal behaviors of the students indicate the tapes make a valuable contribution to the course content. To date, the most serious criticism of the tapes relates to their length. If the students watch a tape for more than 30-45 minutes, they begin to get restless and lose interest. Maximum effectiveness would seem to accrue where tapes could be edited to provide highly specific information within a 30-minute time span.

The overall reaction of the sponsoring instructor is that the making and subsequent use of videotapes is well worth the time and effort involved. The Instructional Television Studio (ITV) facilities seem to be very complete, and the staff are able to produce high quality work. It is highly recommended that other faculty members take the opportunity to supplement their class content with videotaped presentations.

COLOR VIDEOTAPED INSTRUCTIONAL SYSTEM FOR SOPHOMORE PHYSICS LABORATORY EXPERIMENTS

C. C. Ijams, Department of Physics

On June 14, 1976, a formal proposal was submitted for a Seed Grant to Facilitate Learning to the Center for Instructional Service and Research of Memphis State University by the Department of Physics. The proposal was for a "Color Videotape Instructional System for Sophomore Physics Laboratory Experiments." The Center was completing its new color television studio at the time of submission, and all of its facilities were made available to us for implementing the project.

On June 21, 1976, approval was given for a grant of \$1,000 to cover the partial expenses of two graduate students, Miss Loretta Diana Pruett and Mr. Louis Benjamin Marshall, who assisted in the actual videotaping of the ten basic experiments performed by all physics students enrolled in the Physics 2111 and Physics 2511 series of laboratory exercises at Memphis State University. Both of these graduate students were experienced individuals. Miss Pruett teaches in the Shelby County public school system and was the individual who actually appeared on the taped instructions. She has had several years experience in teaching basic physics courses. Mr. Marshall, with a background in public relations at International Harvester and General Motors, assisted in both the development of the instruction and the actual taping by Miss Pruett.

Each devoted a minimum of twenty hours per week for the period covered by the proposal and received a remuneration on an hourly basis at student employment rates. The total amount for both of these individuals did not exceed \$1,000, each receiving a maximum of \$500.

From Physics Department funds, all color equipment necessary for the use of these color videotapes had been purchased. Two complete sets of this equipment were secured from Bluff City Distributing Company. In addition to this basic hardware, the Department of Physics secured forty Memorex videotape cassettes, purchased from Nolan's Ideal Pictures Company. The total expenditure for this equipment and cassettes approximated \$5,000.

The ten basic experiments to be recorded on color videotape constituted the basic core of our sophomore physics courses, normally taken by approximately 500 students annually.

These include:

- 1) Measurement - The Metric System
- 2) Graphing
- 3) Vectors - The Force Table
- 4) Acceleration Due to Gravity
- 5) Centripetal Acceleration
- 6) Momentum - The Ballistic Pendulum
- 7) Moment of Inertia
- 8) The Simple Pendulum
- 9) Simple Harmonic Motion
- 10) Resonance - The Velocity of Sound in Air

It was a source of real pleasure and pride that the entire project was completed in time for use in the 1976 fall semester of Memphis State University.

When the first tapes were shown to the staff of the Department of Physics, including all graduate assistants as well as teaching staff, to say that the response was overwhelmingly complimentary is simply stating it mildly.

Student response was also most gratifying. Used by 165 students enrolled in Physics 2111 and 120 students in Physics 2511, comprising a total of 10 different laboratory sections, the tapes insured that each pupil secured the same instructions, complete in every detail. Moreover, they could be used for other group presentations as well as for individual instruction for make-up and other learning situations.

So pleased were all concerned that we plan to utilize this same system in all basic laboratory courses, including freshmen as well as sophomore courses. Presently, this will include an average student enrollment of approximately 1,000 students per semester.

In fact, an additional complete set of equipment has been ordered, thus enabling the Department of Physics to operate three color videotaped instructions simultaneously. By astute scheduling, we can thus provide this instruction to all basic laboratory sections.

Moreover, the graduate assistants are so pleased with the system that they themselves plan to tape the instructions on their own time during the 1977 spring semester.

Future plans for the system include:

- 1) Re-editing some of the present tapes for greater clarity and adaptability.

- 2) Requesting the Center for Instructional Service and Research to make an in-depth evaluation of student learning responses to the system.
- 3) Making the finished tapes available to other institutions.

We feel that such a system represents a distinct break-through in basic physics laboratory instruction, which has always been a source of concern to physics departments throughout the nation.

VIDEO SPANISH REVIEW PROGRAM

*Franklin O. Brantley, Department
of Foreign Languages*

As an aid to students having difficulty in first-year Spanish, a special video program was produced by Memphis State during the 1976-77 academic year. The program consists of a series of review lessons covering the first-year course, each video lesson being a summary of the week's work in the classroom. Mr. José Upegui, a tutor with the Educational Support Program in the Foreign Language Department, acted as the video instructor; the program was produced in the Instructional Television Studio of the Center for Instructional Service and Research. As each lesson was completed, the tape became available to students in the Learning Media Center in Brister Library. By the end of the academic year, all of the tapes for the first-year course were completed; and, no doubt, they will be used by students for years to come.

Although conceived primarily as a remedial device for students needing more than the usual amount of instruction, this video program in elementary Spanish was actually used by students at all levels of competence in the first-year course. This is understandable for the program provides an excellent means of reviewing course material and allows each student to proceed at his own rate.

During the spring semester 1977 Mr. Sam K. Rushing conducted a study of the effectiveness of the tapes. Mr. Rushing coordinated the project for the Center for Instructional Service and Research and assisted with several aspects of it. The following information is based on a report of this work. The study collected information concerning the extent to which the tapes were used and compared the degree of use by individual students with grades made in the course by the students. Figure 1 shows the number of times that tapes were viewed by individual students, plotted against the final course grade assigned to each student.

Number of Times Tapes Viewed	Course Grades					
	A	B	C	D	F	Drop
10+	1	0	3	0	0	0
7 - 9	0	4	1	2	0	0
4 - 6	2	2	5	1	0	0
1 - 3	10	12	14	6	1	10
0	69	69	56	41	30	125

Figure 1. Use of Videotapes Plotted Against Student Grades

Since it was desired to use the χ^2 test of statistical significance and a number of cells of Figure 1 did not contain enough observations in several cells to satisfy the requirements of the χ^2 test, the values in adjacent cells were combined. The grade cells were modified to reflect "satisfactory" and "unsatisfactory" instead of letter grades. The category "satisfactory" includes grades A through C; "unsatisfactory" includes D, F, Drop, and Withdraw. The "student use" cells were combined to reflect "nonuse," "one-time use," and "use two or more times," as shown in Figure 2. The χ^2 test applied to these data indicated a high degree of statistical significance, less than .001 - indicating less than one chance in 1,000 that the observed cell frequencies could be attributed to chance. Figure 3 shows the cell frequencies that would be expected if use of the tapes were completely unrelated to performance in elementary Spanish. Thus, if there were no relationship between viewing the tapes and satisfactory performance in the course, one would have expected the number of students who did not use the tapes but performed satisfactorily to be about 208, but only 194 students who did not use the tapes performed satisfactorily. Similarly, one would have expected about 24 students who used the tapes only once to perform satisfactorily if use of the tapes and performance were unrelated; instead, 30 of these students had a satisfactory level of performance as shown in Figure 2. The largest relative difference

Number of Times Tapes Viewed	Satisfactory Grades	Unsatisfactory Grades	N
2+	23	5	28
1	30	16	46
0	194	196	390
N	247	217	464

Figure 2. Observed Cell Frequencies

$\chi^2 = 13.958$, $df = 2$,
significant at the .001 level

Number of Times Tapes Viewed	Satisfactory Grades	Unsatisfactory Grades	N
2+	14.905	13.094	28
1	24.487	21.512	45
0	207.607	182.392	390
N	246.999	216.998	464

Figure 3. Cell Frequencies that would be Expected if Student Use of Videotapes and Grades Were Unrelated

occurred in the case of students who used the tapes two or more times; here a number of students that would have been expected to perform satisfactorily, had there been no relationships between use of the tapes and satisfactory performance, would have been about 15, while actually 23 of the students who viewed two or more of the tapes performed at a satisfactory level.

The results are interpreted to indicate an association between satisfactory performance in the Spanish course and viewing of the videotaped lesson summaries. The findings do not necessarily indicate that watching the tapes *caused* performance in the course to improve. The findings do indicate, however, that the students who used the videotaped reviews tended to be the same students who performed satisfactorily in the course.

One final point, there was some disappointment that a relatively small proportion of the students enrolled in elementary Spanish availed themselves of the opportunity to use the tapes. Subsequent classes are receiving more encouragement to use the tapes than was true during the spring, 1977, semester, to use the tapes, and this increased promotion of the tapes is expected to result in their use by a substantially larger number of students.

PART V

MEASUREMENT AND EVALUATION

UTILIZATION OF PSEUDO-ISOCHROMATIC PLATES IN THE PERCEPTION OF COLOR OF STUDENTS IN ART

Richard L. Boffoly, Department of Art

The purpose of this paper is to discuss the utilization of Pseudo-Isochromatic Plates (PIC) in ascertaining the status of the perception of color of students in an art ambience. It is also the aim of the report to attempt to make the testing of variance in color perception more generally known in art and to art instructors; furthermore, it is the author's firm conviction that testing of color perception of students in art should become a standardized procedure in every art department much as it has been accepted by the Art Department, Memphis State University. Instructors who are concerned with art in any of the three majors areas as in Art Education, Art History, and Studio Art have a greater requirement to utilize color as a phenomenon of Aesthetics since they deal directly with this particular element of design rather constantly.

It is reported that approximately 10% of the general population has some variance in the perception of color (Burnham, et al., 1963). In the year 1963, Burnham stated that there were more than ten million people with the red-green color defect in the United States. The blue-yellow color anomaly is of little consequence for this study since its occurrence is exceedingly rare.

In reference to these claims, art curricula do not have any requirements that test the variance of color perception of students. The testing of art students for variance in color perception has never been attempted before, although in other civilian and military occupational specialities color perception has been extensively studied. In addition, no attempt has ever been made possibly to organize some instructional material so that people who teach art can detect and possibly offer assistance to students who may have variance in color perception.

The rationale concomitant with this study is as follows. If a person has a deficiency in some color, this person would fail to appreciate some part of the visual spectrum (color). When such students attempt to mix colors (pigments) in order to produce a specific color effect, as in matching colors from a landscape, they may over or under compensate in mixing colors without being aware of it. Such students may very well add or subtract colors that they cannot perceive as hue in their attempt at color mixing. This deficiency becomes readily discernable in painting and is evident

when color is used for various aesthetic purposes in art classes.

A caveat must be issued here, that is, in the testing of art students for color variance. It is not the purpose of this study to identify students in art who have variance in color perception with the ultimate aim of weeding them out of an art program. However, it must be stated that this is often done primarily because the art instructor does not have a fundamental concept of the student's actual color deficiency or anomaly.

Furthermore, Pickford (1972) states, "In general, artistic ability is not correlated with the absence of colour vision defects. Many colour defective students could become very good artists." He continues, "Art teachers, however, may not be the ones to deal most adequately with students who have variance in color perception."

Little information is available in terms of the dialogue the instructor utilizes concerning variance in color perception. It is no wonder that art instructors have not been considered as adequate to the task of dealing with such students. Testing of variance of color perception is a tricky business at best, since no one test alone can provide a definitive diagnosis of color variance, if indeed this is necessary in an art context.

This paper presents information relative to the characteristic ways in which art students with color variance may perceive color. In addition, one simple test for identifying variance in color perception is discussed. Such a combined approach may greatly assist the art instructor in offering assistance to his students who exhibit color variance.

In a study of color perception, the author conducted a more definitive investigation and analysis of works completed by students in art with color variance. Six different screening instruments were utilized to test students for color variance. The students who indicated that they possessed a variance in color perception were required to complete an acrylic painting of a landscape by matching one which served as the model painting. In essence, the students with variance in color perception were to match the hues, in value, and intensity of a model which was a pre-designed painting arranged by the author. From this study, information was compiled relative to the characteristic ways in which art students perceive and depict color on to a canvas.

There has been a variety of paradoxical investigations that have been conducted in the field of color. There is extensive, even massive, information on color. However, most of the studies have reference to the physical, physiological, and psychological use of color. Cruz-Coke (1970) discusses in detail, theories of color vision. Burnham, et al. (1973), discuss the complexities of colorimetry, etc. These studies, the latter and the former, are somewhat in the nature of sophisticated information relative to color perception, and as such may not be comprehended by the average art instructor.

Therefore, such studies will not be referred to in this paper.

The author took the prerogative and simplified the taxonomy of variance in color perception in order to accommodate the practical art instructor who may not have extensive knowledge concerning the perception of color. It would be beneficial to the art instructor and student, if both were cognizant of the rudiments of the theories of color vision. It will be assumed that the art instructor and student will, therefore, become cognizant of such theories.

Goethe (Pickford, 1972), Liebreich (1872), and Angelucci (1908) have discussed defective color vision in relation to art; in addition, the authors have identified well-known artists in the past who were thought to have variance in color perception as indicated from their paintings. Pickford (1972) studied the paintings of an artist who was considered to have a Protanomalous color deficiency and another who was an extreme Protanomalous. The former artist used saturated reds, blues, golden yellows, and black very freely and to some extent green. But the artist by and large avoided greens and to a greater extent he avoided red-green contrasts.

The second artist with variance in color perception noted by Pickford used blue, yellows, and browns freely with little red or green; he was an extreme Protanomalous. He had very poor red-green discrimination and learned to avoid these colors in his paintings. Another artist is mentioned by Pickford, this artist was a complete Protanope. He used yellow ochres, oranges, blues and blacks but very little red-green. All of these reports of color deficiency, it appears, were not done under any sign of controlled conditions. They simply were observations of paintings which the artists completed.

The classification of color deficiency was derived from von Kries (1895); Pitt refined it in 1944, and the present classification is based on Wright's system (1946). The total classification system of "Color Blindness" is as follows:

- I. Monochromat
- II. Dichromat
 - A. Protanope
 - B. Deuteranope
 - C. Tritanope
- III. Trichromat
 - A. Anomalous
 - 1. Protanomalous
 - 2. Deuteranomalous
 - 3. Tritanomalous
 - B. Normal

- I. The Monochromat - has only achromatic visual responses and is not commonly found and not considered in this study.
- II. The Dichromat - here the individual is able to perceive only two primary colors and can match all colors with two of the three primaries.
 - A. The Protanope (protanopia) is red deficient.
 - B. The Deuteranope (deuteranopia) is green deficient.
 - C. The Tritanope (tritanopia) is blue deficient but is rarely found.
- III. The Trichromat requires three colors to match all color stimuli; but these matches are not like the matches of the normal person; they differ from the normal in the amounts of each color mixed. This type has three subgroups.
 - A. The Anomalous protan (protanomalous) is weak in the perception of red.
 - B. The Anomalous deutan (deuteranomalous) is weak in the perception of green.
 - C. The Anomalous tritan (tritanomalous) is weak in the perception of blue. This condition is found so infrequently, if ever, that it is not considered further in this study.

Essentially, the people who are involved in art should be concerned with only the red-green deficiency in color perception since this is the type that is more prevalent. Therefore, only the variance in red-green color perception need be discussed in this paper; this refers to the protanope (red deficiency) and deuteranope (green deficiency) both of which are more severe in color deficiency than the color confusion found in the protanomalous or deuteranomalous student.

METHOD

Subjects

Ss were graduate and undergraduate college students who were enrolled in some class in art; they were all volunteers for this study, and there was no age restriction in order to become a subject for the study. The total number of Ss was 309.

Apparatus

In this study, the author utilized six Color Perception Tests to measure

variance in color perception of students. The tests were:

- 1) American Optical Pseudo-Isochromatic Plates (PIC)
- 2) Tokyo Color Vision Test
- 3) HRR-Pseudo-Isochromatic Plates
- 4) Ishihara Test for Color Blindness
- 5) Farnsworth-Munsell 100 Hue Test
- 6) Anamoscope (by Schmidt and Haensch)

The most utilized test for measuring variance in color perception in this study was the AO-PIC Test. This is the color perception test that is currently available in print and which the author suggests be utilized for testing Ss for variance in color perception by art departments.

The AO-PIC Test is one which involves the perception of chromatic dot patterns on a background of different chromatic dots (Hardy, et.al., 1946). Both the figure and the background on a PIC plate are composed of many dots or disks which vary irregularly in the lightness they produce; the figures in the AO-PIC Test are of Arabic numerals. If the testee fails on more than five of the plates, he is considered to have a red-green color defect.

Procedure

The procedure of the AO-PIC Test simply is done under luminant C or blue light or overcast daylight; the subject reads the numbers on each plate and then flips over each plate until the 14 plates are completed. It is an individualized test and is not adapted for group testing. It requires three minutes to administer the entire test.

RESULTS

Of the total number of 309 Ss in this study who were screened, 105 were male, and 204 Ss were female. From this total number of Ss, 22 missed five or more plates; this number constituted a valid or sufficient degree of color variance for further study. However, of these latter Ss, who represented seven percent of the total who indicated color deficiency, only eight Ss made themselves available for completion of the study, i.e., to duplicate a landscape painting after a control model.

- ✓ It would appear in interviewing these Ss, that the stigma of having fellow students or instructors know that one has a color deficiency was a major reason for these students not to continue in the study. Of the Ss remaining, three were females and five were males. In the female group, one woman was identified as red deficient while two women were stated to be green deficient. In the male group, three were red deficient and two were green deficient.

In a further analysis, the following was found: see Table 1 - Anomalous Perception of PIC Plates.

Table 1
Anomalous Perception of PIC Plates

<u>Number of Plates Missed</u>	<u>Ss</u>	<u>Percentage of Total</u>
1 or more	176	57
2 or more	86	28
3 or more	34	11
4 or more	31	10
5 or more	22	7

DISCUSSION

We will discuss only the red-green color variance since the blue-yellow variance, as stated earlier, is not a significant amount. Uncovering a variance in color perceptions by utilizing only one test instrument is not very reliable; in this context it must be reinforced and verified by color variances (color errors) that may be discernable in the students' paintings. The latter has reference to over or under compensation in the use of red or green and also of their mixtures with other hues. The typical hues of the visible spectrum and their wave lengths are now presented (Burnham, et al., 1963).

Wavelength Regions (in millimicrons μ)

Hues

380 - 470	Reddish Blue
470 - 475	Blue
475 - 480	Greenish Blue
480 - 485	Blue-Green
485 - 495	Bluish Green
495 - 535	Green
535 - 555	Yellowish Green
555 - 565	Green-Yellow
565 - 575	Greenish Yellow
575 - 580	Yellow

Wavelength Regions
(in millimicrons μ)

Hues

580 - 585	Reddish Yellow
585 - 595	Yellow Red
595 - 770	Yellowish Red

In general, the Protanope (erroneously called red blindness) seems to confuse hues that are red and bluish green with neutral tones. This individual may perceive only those hues that go as far as 680 μ ; to him the visible spectrum is shortened; he sees primarily blues and yellows (two hues). The spectrum may have a neutral grey at about 492 μ . He may not be able to discern red entirely.

The deuteranope sometimes referred to as green blindness, a misnomer, tends to confuse bluish red and green with neutral tones. He also perceives two hues, blue and yellow primarily; he may have a neutral zone in the bluish-red area around 498 μ . He may not be able to discern green entirely. The protanope has a tendency to see the long wavelengths more dark. Now the Protan or protanomalous student is weak in the perception of red-green but is more red weak than he is for green. He may require a greater than normal amount of red in his matching and mixing of colors. He may have a neutral grey in the 540 μ wavelength. The Deuteranomalous has a green weakness; he may require more than the normal amount of green to match and mix colors.

A point to be noted here is that an art student, or anyone else for that matter, who has a color variance, say red-green, will mix and match colors in one of the three different avenues of approach.

- 1) He may over compensate for his color deficiency and thus include more amounts of this color in his depicting of a color. Thus, a Protan (red-deficient) may add much more red to his color mixtures than he is aware of. The painting may appear to the normal person as an overabundant use of red.
- 2) Continuing with the example in number one, that Protan may select to undercompensate in red in his color mixtures; so his paintings may be devoid of red.
- 3) The person with a red-green deficiency may be able to guess at the "correct" amount of red or green required for his color mixing or matching.

If the student has simply a Protanomalous or Deuteranomalous color deficiency, it may have little effect on his color work, because he may have good hue discrimination although his scale of hues may differ from the normal.

It is not the purpose of this paper to require that a student with variance in color perception be identified by the art instructor according to a specific classification title. All the instructor is required to do is become aware of his students who confuse colors in a systematic manner. Thus, reds may be painted much darker; red may be confused with dark brown or even black; also, pale blue may be painted as rose pink, this being the perception of color of a Protanomalous student.

Students may paint red as black, while green, yellow, and brown may all be painted alike or with little differentiation between them, this being the Protanope.

The most typical example of red-green deficiency would be when the student cannot distinguish between browns, greens, and reds; he will have little difficulty with blues and yellows. Certain colors may be difficult for a red-green deficient student to discriminate (as between brown and green) when the colors are separated; but when these colors are juxtaposed, the student may be able to differentiate between them.

Also typical of the red-green students' variance in the perception of color is to paint colors of indigo, violet, and purple hues as of one dark or even lighter tone or tint. The general tendency of students with either red or green color deficiency is to make their colors more dark rather than more light, but they do tend to resort to either of these methods of depicting colors.

The manner in which students with red-green deficiency complete a painting (i.e., as a landscape) is to darken and make most colors greyer. Thus the total composition may appear as though the sun had hidden behind a cloud. The students of this type of color deficiency also seem to make the composition more warm, depict both in the same composition greater contrasts of reds and greens, and also have areas that appear both light and dark. These students may have a complete color reversal, such as painting a tomato emerald green or may simply paint the red tomato a dull brown; the same applies for green colored objects, these being painted red. It is the pale hues that are also confused; pale pinks and pale greens are constantly confused as being of other hues, as blue or brown, etc.

The student with a variance in color perception may also have considerable difficulty in matching hues that occupy a small circumscribed area in the composition. The color deficient individual may tend to combine or perceive different hues as being alike or without differentiation; these may be:

- Blues and violets
- Green yellows and fawns
- Greens, moles and grey
- Greens and browns
- Light greens and yellows
- Pale greens and pink
- Greens may be matched with grey, lavenders and blues

Recommendations

A list of recommendations is presented whereby an art instructor may be able to suggest ways for a student to consciously avoid horrendous color errors in paintings; to possibly help the students in handling color harmony in his work; and to possibly satisfy the student's personal color scheme in his painting.

- 1) The student should be made cognizant of his color variance, if indeed he does have such a deficiency. This may be uncovered in the initial testing of color perception of which the art instructor will be aware.
- 2) The instructor should assist in arranging the student's palette possibly to follow the sequence of colors of the visible spectrum. This arrangement may allow a student to select a hue in which he may be deficient, to better mix another hue.
- 3) The student should be totally familiar with modular hues; he should utilize the color notation on the tube to give him guidance in using and mixing new colors.
- 4) If the student has a color variance, he may find it advantageous to utilize the Munsell Color Notation paper, preferably in large sheets. The larger the area of color used as a stimulus, the more vivid an impression on the student's sensory system it may have. He may use the Munsell color paper, which is notated by the designation H V/C (hue, value, and chroma), to make comparisons between colors. The instructor can be of great assistance in this aspect.
- 5) The student should maintain a pocket notebook in which to make reference as to conditions that assist him in identifying colors with which he may have difficulty.
- 6) He should be well aware that specific objects are characterized by specific colors, i.e., as a tomato is generally red.
- 7) The student should be made aware of tints, tones, and shades that require special treatment by any of the suggestions listed above or avoid them.
- 8) Lighting is most important; for less confusion of colors, the students would do well to paint under a source of illumination, if possible, referred to as CWX (cool white deluxe) fluorescent tube. This lighting provides a truer rendition of color (Boffoly, 1967). At least, working under an illumination that in itself will least influence the perception of colors is a step in the right direction.

This study should be a continuous process of screening art students every semester, especially in beginning design courses.

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EVALUATION OF THE M.S.U. SEED GRANT PROGRAM

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During the fall semester, 1977, a comprehensive evaluation was conducted of all functions performed by the Center for Instructional Service and Research. The following information is based on data collected for the evaluation but pertains only to one of the functions, the Seed Grant Program. The primary purpose of the evaluation project was to provide information needed to improve the various services provided by the Center for Instructional Service and Research. The rationale for the procedure used in the evaluation was arrived at in the following way.

- 1) The mission of the Center, "to facilitate student learning throughout the University," derives directly from one of the major objectives of the University, that of providing quality instruction at the undergraduate and graduate levels.
- 2) Since it is through the faculty that the University achieves its instructional objectives, it follows that providing assistance to the faculty is the primary means by which the Center can accomplish its mission. Thus, the faculty becomes a prime source of information concerning how well the Center is accomplishing its mission and what steps may be taken to improve its performance.

PROCEDURE

The first step was to make explicit the objective of each of the 19 functions of the Center. In the case of the Seed Grant Program, the objective was stated as follows: "To provide resources and assistance to faculty members who wish to improve their courses, develop new courses, or improve student learning by various means." The next step was to construct a survey form which included four items. The first was concerned with how important the objective was considered to be by the faculty member responding to the survey. Both faculty members who had participated in the Seed Grant Program during the 1976-77 school year and a sample of those who had not were asked to respond to the question. The remaining three items were responded to only by faculty members who had participated in the Seed Grant Program during the year. One of these questions asked how well the objective was being achieved; another asked whether the objective itself should be eliminated,

modified, augmented, or left as it was. Amplifying comments were invited concerning the response given. The final item on the form asked how the performance of the Center for Instructional Service and Research could be improved in the area of Seed Grants to Facilitate Learning. This last question did not follow the multiple choice format used in the first three items but instead required a constructed response. The survey form may be seen in Figure 1.

RESULTS

As shown in Table 1, the survey was sent to the 30 faculty members who had participated in the Seed Grant Program during the preceding year. Twenty-eight faculty members completed the form, for a 93% return. However, some did not complete all parts of the survey; the number completing each part is shown in the column labeled N. Table 1 shows that 100% of the group that had participated in the Seed Grant Program and replied to the survey stated that the objective of the Seed Grant Program was "Very Important." In replying to how well the objective was being achieved, 63% said "Exceptionally Well," 33% said "Satisfactorily," and 4% said "Marginally." None said that the objective was "Not Being Achieved." These responses were among the most positive received concerning the 19 objectives of the Center.

Table 2 shows how the participants in the Seed Grant Program responded to the third item, concerning possible actions that might be taken with respect to the program. The most frequently selected alternative was that the program should be augmented, with 52% selecting this alternative. The second most popular was "Leave As Is." Forty-three percent selected this alternative. Five percent selected the option indicating that the program should be modified, and none said that it should be eliminated.

The second part of this question asked for amplifying comments, as appropriate. Sixteen members of the group made comments. These comments were classified according to affective tone and also according to content. These classifications are shown in Table 3. Thirteen of the sixteen responses were classified as "Neutral," two as "Favorable" and one as "Unfavorable." In the content categories the most frequently occurring classification was "Constructive Suggestion For Improvement" with ten of the sixteen responses being classified in this category. Two fell into the "Praise" category, two in "More Resources Needed," and two into extraneous categories that were not readily classifiable. None of the responses was classified as "Negative Criticism" and none indicated that "More Information to Faculty Concerning Service" was needed. The verbatim responses to this item are shown in Figure 2.

The responses made by 18 faculty members to the last item on the survey, concerning how the Center could improve its performance with respect to the Seed Grant Program, also were classified according to affective tone and according to content. This information is shown in Table 4 and the

EVALUATION SURVEY-1.3

Function: Seed Grant Program

Objective: To provide resources and assistance to faculty members who wish to improve their courses, develop new courses, or improve student learning by various means.

Questions:

1. How important is this objective? (Mark one)
 - ☐ a. Unimportant
 - ☐ b. Limited Importance
 - ☐ c. Important
 - ☐ d. Very Important
2. Based on your experience with the Center, how well is the objective being achieved?
 - ☐ a. Not being achieved
 - ☐ b. Marginally
 - ☐ c. Satisfactorily
 - ☐ d. Exceptionally well
3. In your view should the objective be: (Mark one)
 - ☐ a. Augmented
 - ☐ b. Modified
 - ☐ c. Eliminated
 - ☐ d. Left as it is

Please comment or amplify as necessary _____

4. Based on your experience with the Center, how could the performance of the Center be improved in this area?

Figure 1. Survey form completed by faculty members who had participated in the Seed Grant Program during the past year (September, 1976, through August, 1977)

COMMENTS

- 1) I believe the word "encouragement" should be included in objective. In my own work, I received almost no encouragement within my department and thus had many doubts as to its being worthwhile.
- 2) Achieve better integration with other campus elements to allow full use of the results.
- 3) Secure increase in funding for student assistants in carrying out approved grants. Try to secure summer salary for staff involved.
- 4) Made more available.
- 5) It should include a statement of a general nature that would allow funds to be allotted to some studies that do not fit into other categories.
- 6) Might be expanded as funds are available.
- 7) I think a yearly emphasis on one program and helping the several "innovators" work together would help the process of innovation.
- 8) The objective is most important as far as I am concerned. However, I question its importance to the University. We seem to be more concerned with quantity rather than quality!
- 9) I believe many worthwhile course improvements are being made, especially with regard to using learning media in standard courses.
- 10) The Center was specific with respect to requirements and goals, helpful in preparation, and prompt in its decisions.
- 11) Guidance for constructing projects and assistance for planning budgets.
- 12) The problem is more than "seed" grants can solve. TIPS, for example, cannot be managed for a large number of sections without continuing support. Departments do not have the resources to provide this support.
- 13) While the Center recognizes and encourages such objectives, the departments do not seem to comprehend the necessity for continuous development of courses, instructional methods, and syllabi. The Center may augment its activities and push such interests by monitoring and evaluating all the departments as to their developmental activities, with a view to securing cooperation and improvement.
- 14) More money!
- 15) Reduce reports and other paper work.
- 16) Develop a system to bring "topical groups" of seed grant participants together to share results and conclusions with an eye toward taking the "next steps" in a particular sequence of research or instructional development.

Figure 2. Amplifying comments concerning suggested actions that might be taken with respect to the Seed Grant Program.

Table 1

Importance of the Objective of the Seed Grant Program and How Well the Objective is Being Achieved

<u>No. of Surveys Sent</u>	<u>Surveys Returned</u>	<u>Importance (% of responses)</u>					<u>How Well Achieved (% of responses)</u>				
		N	1	2	3	4*	N	1	2	3	4**
30	28	28	0	0	0	100	25	0	4	33	63

*1 - Unimportant
 2 - Limited Importance
 3 - Important
 4 - Very Important

**1 - Not being Achieved
 2 - Marginally
 3 - Satisfactorily
 4 - Exceptionally well

Table 2

Suggested Action Concerning the Seed Grant Program

<u>No. of Responses</u>	<u>Action Suggested (% of responses)</u>			
	<u>Eliminate</u>	<u>Modify</u>	<u>Augment</u>	<u>Leave As Is</u>
22	0	5	52	43

Table 3

Classification of Amplifying Comments Concerning Suggested Action Concerning
the Seed Grant Objective

<u>No. of Responses</u>	<u>Affective Tone</u>			<u>Content Classification</u>					
	<u>1</u>	<u>2</u>	<u>3*</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6**</u>
16	1	13	2	0	2	0	10	2	2

*1 - Unfavorable
2 - Neutral
3 - Favorable

**1 - Negative Criticism
2 - More Resources needed
3 - More information to faculty
concerning service
4 - Constructive suggestion for
improvement
5 - Praise
6 - Other

Table 4

Classification of Comments Concerning How the Seed Grant Program Could be
Improved

<u>No. of Responses</u>	<u>Affective Tone</u>			<u>Content Classification</u>					
	<u>1</u>	<u>2</u>	<u>3*</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6**</u>
18	0	14	4	0	6	3	5	2	2

*1 - Unfavorable
2 - Neutral
3 - Favorable

**1 - Negative Criticism
2 - More Resources needed
3 - More information to faculty
concerning service
4 - Constructive suggestion for
improvement
5 - Praise
6 - Other

HOW SEED GRANT PROGRAM COULD BE IMPROVED

- 1) Coordinate plans and results with library, budget projections, etc.
- 2) Funding for assistants, both graduate and undergraduate, is a MUST if the program is to succeed.
- 3) Inform the faculty.
- 4) Center has served my needs well - more research grants available to faculty could be helpful.
- 5) To seek more funds.
- 6) I think the Seed Grant Program is being run well. Some attention may be needed in the area of evaluation of proposals and performance as requests for funds increase in the future.
- 7) Based on my experience with the Center, I find they could not be more cooperative and receptive to suggestions, changes, etc.
- 8) If it had more money, it could lend more support.
- 9) Since many persons on campus are only dimly aware of the Center's function (and, in some cases, even its existence), some modifications of the methods by which its work is publicized might be indicated.
- 10) Make SEED grants every month if possible, better than once or several times a year.
- 11) In an ideal world, the total amount and freedom of use in funding would be increased. But present limitations are very workable.
- 12) I believe a conference between the director of the Center and the faculty member whose proposal has been approved would be extremely helpful (Immediately after approval and before the project is begun).
- 13) I am not sure but I believe that many faculty are surprisingly ignorant of the services and support available through this program.
- 14) The interplay of the SEED grant provisions vs. faculty release time and teaching loads is still muddy.
- 15) Continuing support!
- 16) More money could be made available to CISR for its functions.
- 17) No comment. I'm happy.
- 18) Secure more funds for more seed grants.

Figure 3. Responses to question concerning how the Center Performance in the Seed Grant area could be improved.

verbatim comments are shown in Figure 3. As in the previous case, the most frequently occurring classification under affective tone was "Neutral;" fourteen of the responses were so classified. Four responses were classified as "Favorable" and none as "Unfavorable." In the content classification all categories received some entries with the exception of "Negative Criticism." Six Seed Grant participants said that "More Resources Were Needed;" three said that "More Information to Faculty Concerning Service" was desirable; five were classified in the "Constructive Suggestion for Improvement" category; two were classified as "Praise;" and the remaining two did not fit readily into any of the categories that were being used.

As previously mentioned, faculty who had not participated in the Seed Grant Program were surveyed with respect to their views concerning the importance of the Seed Grant Program but not with respect to the issues addressed by the other items. The omission of the last three items was due to this group's not having an adequate basis for responding to these items. For purposes of convenience, this group will be referred to as the "Non-user" group. It should be added that this group consisted of a random sample of MSU full-time faculty who had not participated in any of the functions of the Center. A survey including the first item, pertaining to the importance of the objective of the Seed Grant Program (and the other 18 objectives of the Center), was sent to 100 Non-users. Sixty of these faculty members completed the survey form. The way in which they responded to the item, concerning the Seed Grant objective, is shown in Table 5. Eighty-six percent of the group selected the "Important" or "Very Important" alternative with the proportions divided equally between these two categories. Twelve percent of the non-users said that the objective was of "Limited Importance," and two said that it was "Unimportant." The responses of the Non-users express a generally positive view of the Seed Grant Program, although not nearly so much so as the responses of faculty members who participated in the program, 100% of whom said that the objective was "Very Important."

In addition to the information presented in the tables, a summary quantification of the importance of the Seed Grant Program was computed for the User and Non-user groups. This was done by assigning values of one through four to the response alternative (Unimportant - 1; Limited Importance - 2; Important - 3; and Very Important - 4), multiplying these values by the number of times the response was selected, and computing the mean value. Thus the highest possible mean score was 4.0; the lowest possible mean score was 1.0. A mean of 2.5 might be thought of as an essentially neutral score. In the case of the group that had participated in the Seed Grant Program, the mean score was 4.0, and the mean score of the Non-user group was 3.28. A similar computation concerning how well the Seed Grant objective was being achieved yielded a mean score of 3.75 for the group that had participated in the Seed Grant Program. The Non-user group was not asked to give its views on this point. As noted previously, when presenting Tables 1 and 5, responses concerning the Seed Grant Program were among the most favorable of those received concerning the 19 functions performed by the Center.

Table 5

Importance of the Seed Grant Objective as Viewed by Faculty Members Who
Had Not Participated in the Program

<u>No. of Responses</u>	<u>Per Cent Selecting Each Alternative</u>			
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4*</u>
60	2	12	43	43

*1 - Unimportant

2 - Limited Importance

3 - Important

4 - Very Important

DISCUSSION

The primary purpose of the evaluation was to obtain information as to how the Seed Grant Program could be improved. The comments shown in Figure 2 and Figure 3, and to some extent the classification of these comments in Table 3 and Table 4, are among the best sources of this information on this point. Tables 1 and 2 already had shown that both faculty who had participated in the Seed Grant Program and those who had not felt that the program was worthwhile.

In reviewing the comments made by faculty members who had participated in the program during the past year, one finds a number of references to the desirability of increasing the resources of the program. This is expressed in several ways, including a plea for a larger number of projects, more funds for projects, broadening the scope of projects that would be funded, and providing more graduate and undergraduate student assistants. Doubtless, these responses were predictable, but at the same time they are important. Under the present program, approximately \$1,000 is as much as is likely to be approved for a single project. If the faculty member who proposes a project does not have to have part of his summer salary or released time during the regular school year taken from the grant, he usually will have enough funds for student workers, supplies, and stenographic services. But if part of his summer salary must come out of his grant, there is very little

if anything left for other budget items. If larger grants could be made available, it is probable that additional projects that are not now being submitted for consideration would be attracted to the program. While it is not clear that additional funds can be made available for Seed Grant purposes, one of the first steps in this direction is to know that there are a number of informed faculty members who feel that increased resources within the program are highly desirable.

The matter of continuing support after the Seed Grant has ended was mentioned by several participants. This problem has been recognized by many grant programs, especially those of foundations that give substantially larger grants than the ones available in the Seed Grant Program. It probably is not desirable for the Center to continue support of projects completed under the Seed Grant Program on an indefinite basis. The responsibility for support of instruction belongs with the academic department concerned, but it is possible that the Center has not done all that might be done to encourage department chairmen to provide the relatively small amount of resources that are needed to continue to obtain the benefits of an instructional innovation that has been completed under the Seed Grant Program. In short, these comments suggest that the Center may have responsibilities that extend beyond the completion date of the various Seed Grants.

One comment was to the effect that it would be helpful if the Center took a more active role in the final planning and execution of the various projects. Doubtless, this is a good point with respect to at least some of the Seed Grants. The extent to which the Center has been involved in planning and execution of Seed Grant projects has varied widely from one project to another. In a number of projects, in which videotapes or other audio-visuals were being prepared, the Center has worked on an almost day-to-day basis with the directors of the Seed Grant projects. There are other instances, however, in which the participation of the Center has been largely confined to providing the director of the project with supplies and personnel. The difference in the level of activity has been due largely to the nature and needs of the project and to the desires of the project directors as understood by Center personnel. This understanding may have been imperfect in some instances. In communicating with Seed Grant project directors during the year the point is made that the Center stands ready to assist in any way it can, but it is possible that this invitation to call on the Center is a bit too general to be taken seriously by all of the faculty members participating in the program. In a related comment a statement was made that encouragement by the Center should be a part of its Seed Grant objective. These are areas in which the Center can perhaps improve its performance now that it is known that the problems exist.

The matter of a central theme of special emphasis on a particular area for a given year was suggested. This has been done with some considerable success in the case of the TIPS (Teaching Information Processing System) projects and in the case of the production of instructional videotapes. It is possible

that this approach could be extended profitably to other areas. This would also have the advantage mentioned in two comments concerning the desirability of faculty members who are working on similar projects discussing them and exchanging information concerning them.

One comment was concerned with a reduction of reports and other paperwork. At present, three documents are required: a proposal, which may be any length desired; a progress report of between 150 and 250 words; and a final report which normally is between four and eight pages in length. The progress report is used to give recognition to the Seed Grant project directors and to the program itself through a faculty newsletter which receives wide distribution within the University and a limited distribution to other institutions. The final reports, such as those included in this monograph, serve the dual purpose of providing a description of the salient points of each project for a variety of uses and also give a degree of recognition to the faculty members who conducted the projects. There is also the prospect that the accomplishments of the Seed Grant Program must be documented if it is to continue to receive budgetary support. While it is true that the value of a project to the department in which it was conducted is not enhanced very much by writing a report concerning it, it seems probable that the positive aspects that have just been mentioned outweigh the negative aspect of requiring time and effort to complete a report. However, it has taken considerable prodding to obtain a few of the final reports, and it may be worthwhile to consider various alternatives to the present reporting procedure.

CONCLUDING COMMENT

The information provided by the evaluation of the Seed Grant Program provides a confirmation of the importance of the program to the faculty of the University and reflects a generally positive view of the way in which the program is being conducted. A number of points also were made concerning how the present program could be extended and improved. Some of the suggestions for improvement cannot be implemented within present resources, but some of them can. In the case of both those that can and those that cannot, the first step toward improvement is the recognition of the problem. The evaluation has been successful in identifying some of the problems involved.

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